PROJECT MANUAL

Including Bid Documents & Contract Documents for Construction of

MID-CONTINENT PUBLIC LIBRARY

WORK PACKAGE 10
COLBERN ROAD BRANCH

1000 NE Colbern Rd, Lee's Summit, MO 64806

PART A

Of Parts A, B, C

GENERAL CONDITIONS
STRUCTURAL & ARCHITECTURAL

JE DUNN CONSTRUCTION

SAPP DESIGN + helix. ARCHITECTS

OCHSNER HARE & HARE - OLSSON - TRUE ENGINEERING

December 23, 2019

SDA PROJECT NO. 17-0900

SET NO._____A

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Owner:	Mid Continent Public Library (MCPL) Administrative Headquarters 15616 East Highway 24 Independence, MO, 64050
Owner's Representative:	Jacob Wimmer, Capital Improvement Project Manager MCPL, Administrative Headquarters jwimmer@mymcpl.org 816.521.7286 (office) 816.550.3625 (cell)
Construction Manager (at Risk)	JE Dunn Construction 1001 Locust Street, Kansas City, MO 64106 Bobby Miller; Project Manager; Bobby.Miller@jedunn.com direct 816.283.9056 mobile 913.636.7663
Architect of Record:	Sapp Design Associates Architects, P.C. 3750 S. Fremont Avenue Springfield, MO 65804 417-877-9600 Brad McKenzie, AIA; Project Manager; mckenzie@sdaarchitects.com James Stufflebeam, AIA; Sr. Project Manager; stufflebeam@sdaarchitects.com
Associate Architect & Interior Design:	Helix Architecture + Design 1629 Walnut Street, Kansas City, MO 64108; 816.300.0300 Taylore Keller, Registered Interior Designer; tkeller@helixkc.com Michael Heule, AIA, Principal, Project Manager; mheule@helixkc.com
Structural Engineer:	Olsson 2111 South 67th Street, Suite 200, Omaha, NE 68106 402.970.2316 Cary Schroeder, PE; Project Manager; cschroeder@olsson.com
MEP Engineer:	True Engineering Group 3659 South Ave, Springfield, MO 65807 417.708.7025 Jacob Nelson, PE, Project Manager; nelson@true-mep.com
Civil Engineer:	Olsson 7301 West 133rd Street, Suite 200 Overland Park, KS 66213 913.381.1170 Terry Parsons, PE, Sr. Project Engineer, tparsons@olsson.com
Landscape Architect:	(Under Separate Contract with Owner) Ochsner Hare & Hare, (a design studio of Olsson) 1801 McGee Street,Suite #101, Kansas City, MO 64108 816.442.6082 Kelly Thompson, LA, Project Mgr.; kthompson@olsson.com

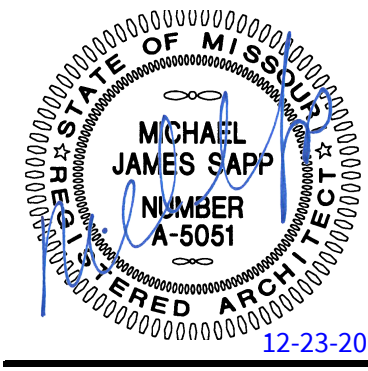
END OF PROJECT DIRECTORY

REGISTRANTS

The personal seal of the registered Architect of Record or each shown Engineer shall be the legal equivalent of his signature whenever and wherever used, and the owner of the seal shall authenticate this sheet and the specification sections pertaining to this sheet. Responsibility shall be disclaimed for all other plans, specifications, estimates, reports or other documents or instruments relating to or intended to be used for any part or parts of this project.

Those sections each discipline is responsible for shall be as listed alongside seal of same.

SEAL



Michael J. Sapp, Architect
MO # A-5051

ARCHITECT OF RECORD

Sapp Design Associates, Architects, P.C.
3750 S. Fremont, Springfield, MO 65804
417-877-9600
Missouri State Certificate of Authority # 000607

Sections:
024119, *042000, 061053, 061600, 072100, 072419, 072726, 074213.13, 074213.23, 075423, 076200, 077129, 077200, 078100, 078413, 078443, 079200, 081113, 081416, 083513.23, 084113, 084413, 087100, 088000, 092216, 092900, 102113.19, 102241, 102800, 104413, 104416

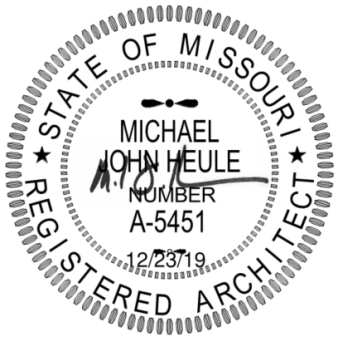
*Architectural only

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SEAL



Michael John Heule, Architect
MO #A-5451

ARCHITECT OF RECORD

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Sections:
033543, 057000, 057313, 060660, 064023, 064116, 083113, 083326, 084136, 092900, 093000, 095100, 096400, 096513, 096813, 097713, 099123, 102239, 102700, 105113, 114000, 121230, 122200, 122413, 123100, 123551.13 329301

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SEAL



Cameron Collingsworth, Structural Engineer
MO # PE-2016003082

STRUCTURAL ENGINEER OF RECORD
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816-301-5397
Missouri State Certificate of Authority # 001592

Sections:
*033000, 051200, 051213, 052100, 051300, 054000, 055000

*Structural only

REGISTRANTS

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Those sections each discipline is responsible for shall be as listed alongside seal of same.

SEAL



12-23-2019

Jacob Nelson, PE
MO# PE-2009018758

MEP ENGINEER OF RECORD

True Engineering Group
3659 South Ave
Springfield, MO 65807
t: 417.708.7025
Missouri State Certificate of Authority #E-2016000752

Sections:
All of Divisions 21, 22, 23, 26, 27, and 28

REGISTRANTS

The personal seal of the registered Architect of Record or each shown Engineer shall be the legal equivalent of his signature whenever and wherever used, and the owner of the seal shall authenticate this sheet and the specification sections pertaining to this sheet. Responsibility shall be disclaimed for all other plans, specifications, estimates, reports or other documents or instruments relating to or intended to be used for any part or parts of this project.

Those sections each discipline is responsible for shall be as listed alongside seal of same.

SEAL



Terry M Parsons, Civil Engineer
MO # PE- 2018010505

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1251 NW Briarcliff Parkway, Suite 50
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Missouri State Certificate of Authority # 001592

Sections:
311000, 312000, 320000, 330500

SECTION 008000 SUPPLEMENTARY CONDITIONS

The following supplements modify AIA Document (A201-2007), General Conditions of the Contract for Construction. Where a portion of the General Conditions is modified or deleted by these Supplementary Conditions, the unaltered portions of the General Conditions shall remain in effect.

ARTICLE 1 – GENERAL PROVISIONS

Add Section 1.2.1.1. to Section 1.2.1

1.2.1.1 In the case of conflicts or discrepancies between Drawings and Divisions 2-49 of the Specifications, or within or among the Contract Documents and not clarified by Addendum, the Architect will determine which takes precedence in accordance with Section 4.2.11, 4.2.12, and 4.2.13.

C. Discrepancies, conflicts, ambiguities, and errors which may have more than one interpretation require that the Architect make the interpretation per General Conditions of the Contract. Per Contract, the default position shall be the more restrictive and/or more costly interpretation, unless a formal interpretation is rendered by the Architect, by addendum, or in writing if occurrence is after bidding.

ARTICLE 2 – OWNER

Delete Section 2.2.3 and substitute the following:

2.2.3 The Owner shall furnish, upon request, surveys describing physical characteristics, legal limitations and utility locations as may be known, and a legal description of the site. The Owner expressly disclaims the accuracy of utility information, and as may be indicated by notes on the Contract Drawings.

Delete Section 2.2.5 and substitute the following:

2.2.5 The Owner will furnish the Construction Manager for General Construction, free of charge, all usable sets of Drawings and Specifications returned after closer of bidding. The Construction Manager, Contractors, and Subcontractors may purchase additional copies at the cost of reproduction, postage and handling.

ARTICLE 3 – CONSTRUCTION MANAGER

Add Section 3.2.5 to Section 3.2

3.2.5 The Owner is entitled to reimbursement from the Construction Manager for amounts paid to the Architect for evaluating and responding to the Construction Manager's requests for information that are not prepared in accordance with the Contract Documents or where the requested information is available to the Construction Manager from a careful study and comparison of the Contract Documents, field conditions, other Owner-provided information, Construction Manager-prepared coordination drawings, or prior Project correspondence or documentation.

Add Section 3.3.4

3.3.4 The Construction Manager shall be responsible for compliance, during the course of the Work, with any laws and regulations that are protective of the environment or human health and safety that are applicable to the Work.

Add Section 3.4.2.1 to Section 3.4.2:

3.4.2.1. After the Contract has been executed, the Owner and the Architect will consider requests for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications. By making requests for substitutions, the Construction Manager:

.1 represents that it has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;

.2 represents that it will provide the same warranty for the substitutions as it would have provided for the product specified;

.3 certifies that the cost data presented is complete and includes all related costs for the substituted product and for Work that must be changed as a result of the substitution except for the Architect's redesign costs, and waives all claims for additional costs related to the substitution that subsequently become apparent; and

.4 shall coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

Add the following to the end of Section 3.4.2:
3.4.2.2 The Owner shall be entitled to reimbursement from the Construction Manager for amounts paid to the Architect for reviewing the Construction Manager's proposed substitutions and making agreed upon changes in the Drawings and Specifications resulting from such substitutions.

Add language to Section 3.5 Warranty:
The warranty shall extend for ONE (1) year after the Substantial Completion date for the project or portions thereof. Certain materials and components which have manufacturer's and/or installer warranties, which may be longer than one year, shall not be limited by the General Construction Manager's general warranty.

Add Section 3.6.1.to Section 3.6 Taxes:
3.6.1. Sales Tax Exemption: The Owner will exercise their tax exempt status and require that the Bid Amount NOT include sales tax on materials. Any materials the Construction Manager wishes to exempt sales tax from may be purchased by the Construction Manager/Sub-Construction Manager by authorization from the Owner via a Project Exemption Certificate, which will be provided by the Owner. The Construction Manager does not have to submit separate pay-direct invoices. The Exemption Certificate became law in August of 1994, and is the preferred method. The Construction Manager and Sub-Construction Managers are obligated to become familiar with the new accounting procedures, responsibilities, and tax law liabilities.

Delete Section 3.7.1 and substitute the following:
3.7.1 The Owner, through the Architect, will submit Drawings and Specifications to the appropriate public authorities for building permit. The Owner will pay all fees for plan review and building permit. Separate fees for electrical, mechanical, and plumbing permits and inspections are to be included in the contract amount and paid for by the Construction Manager.

Add Section 3.8.3.1 to Section 3.8.3:
Construction Manager shall indicate to the Architect any impact on the Contract time that any work in an Allowance item may have. And shall request in a timely manner additional information necessary to schedule, coordinate, and complete work required by an Allowance item. See Section 012100 Allowances.

Add 3.12.5.1 to Section 3.12.5:
3.12.5.1 The Construction Manager shall include an indicator stamp on all submittals and shop drawings, which indicates the Construction Manager has reviewed the items and found them to be in compliance with the Contract, and showing the name and date of authorized reviewer. The Architect will not review submittals and shop drawings without the Construction Manager's stamp affixed.
3.12.10 At paragraph 3.12.10, in the third and sixth sentence which in part reads "…all performance and design criteria…" Change the word "all" to "appropriate".

Add Section 3.12.11 to Section 3.12:

3.12.11 The Architect's review of each Construction Manager's and Contractor's submittal will be limited to examination of an initial submittal and one (1) resubmittal. The Owner is entitled to obtain reimbursements from the Construction Manager for amounts paid to the Architect for evaluation of additional resubmittals.

ARTICLE 4 – ARCHITECT

Add 4.2.2.1 through 4.2.2.4 to the end of Section 4.2.2:

4.2.2.1 The Owner is entitled to reimbursement from the Construction Manager for amounts paid to the Architect for site visits made necessary by the fault of the Construction Manager or by defects and deficiencies in the Work.

4.2.2.2 Observations by the Architect shall in no way warrant or guarantee to the Owner and Construction Manager that all components of the work have actually been provided in exact compliance with the Contract requirements. The Construction Manager shall bear full responsibility for compliance with this Contract between Owner and Construction Manager, and for fulfillment of same.

4.2.2.3 Wherever in this Contract the term "inspection" is used as an action of the Architect, it shall mean "general observation" and as further described in 4.2.2 and 4.2.2.2 above.

Add the following language to Section 4.2.3:

4.2.3.1 The Architect's report to the Owner regarding the general progress of the work shall be based upon general observations, and upon information provided by the Construction Manager including verbal reports, pay applications, and the Construction Manager's construction schedule. The Architect shall not be responsible for damages resulting from the progress, or lack thereof, of the Work.

Add the following language to Section 4.2.14.1:

4.2.14.1 Construction Manager's requests for information shall be prepared and submitted in accordance with Division 1 "General Requirements" sections on the form include in the Contract Documents, or form acceptable to the Architect or on AIA Document G716-2004. The Architect will return without action requests for information that do not conform to requirements for the Contract Documents.

ARTICLE 7 – CHANGES IN WORK

Add Section 7.1.4 to Section 7.1:

7.1.4 The combined overhead and profit included in the total cost to the Owner for a change in the Work shall be based on the following schedule:

.1 For Construction Manager, for Work performed by the Construction Manager's own forces, 10 percent of the cost.

.2 For the Construction Manager, for Work performed by the Construction Manager's Subcontractors, 10 percent of the amount due the Subcontractors.

.3 For each Subcontractor involved, for Work performed by that Subcontractor's own, forces, 10 percent of the cost.

.4 For each Subcontractor involved, for Work performed by the Subcontractor's Subcontractor, 10 percent of the amount due the Sub-Subcontractor.

.5 Cost to which overhead and profit is to be applied shall be determined in accordance with Section 7.3.7.

.6 In order to facilitate checking of quotations for extras or credits, all proposals, shall be accompanied by a complete itemization of costs including labor, materials, and Subcontracts. Labor and materials shall be itemized in the manner prescribed above. Where cost items are Subcontracts they shall be itemized also.

ARTICLE 8 – TIME

At paragraph 8.3.1, delete the words "…unusual delay in deliveries, unavoidable casualties…"

Add Section 8.3.4 and 8.3.5 to Section 8.3:

8.3.4 Delays due to adverse weather shall comply with 15.1.5 and an adverse weather day be specifically defined as any work day in which less than 60% of the scheduled work for that day cannot be completed due to weather-related conditions and that such work will have an effect on critical related trade work affecting the completion date. The Contract Time shall include an allowance for adverse weather days equal to a ratio of 3 work days for every 30 calendar days of Contract time or as stipulated in the bidding documents. Requests for extensions of time due to weather shall be evaluated on the basis of lost days in excess of the above allowance. The accounting of adverse weather days will be compounded for the duration of the Contract Time, and not on a monthly basis for purpose of modifying the Contract on a monthly basis; and to be evaluated at the approximate 75% completion mark of the schedule, and after as may be needed to reasonably review and process expected extensions to the Contract Time. Working days exclude weekends.

8.3.5 When the Contract Time has been extended, as provided under 8.3, such extensions of time shall not be considered as justifying extra compensation to the Construction Manager for General Construction for office administrative costs, overhead, and other costs related to Division 0 or Division 1 requirements.

ARTICLE 9 – PAYMENTS AND COMPLETION

Add the following sentence to Section 9.3.1:

The form of Application for Payment, duly notarized, shall be a current authorized edition of AIA Document G702 – 1992, Application and Certificate for Payment, supported by a current authorized edition of AIA Document G703 – 1992, Continuation Sheet.

Add Section 9.3.1.3 to Section 9.3.1:

9.3.1.3 Until Substantial Completion, the Owner shall pay 95 percent of the amount due the Construction Manager on account of progress payments. 5% shall remain in retainage, except as may be certified by the Architect for payment by the Owner, by regular application after substantial completion and only for work verified to be completed by the Architect's observations. Field Observations and reviews by the Architect after Substantial Completion are limited (see Sections 012900 and 017700) and, therefore, pay applications for balance of contract after Substantial Completion may not be certified until such field observation and reviews are scheduled. Further, the amount of work remaining to be completed after Substantial Completion, or partial substantial completion may have amounts retained at a value of 150% of the estimated value of the work. The Construction Manager shall provide a written and itemized estimate of all work remaining, to be included with the Pay Application, for the Architect's review and approval, or adjustment thereof if required.

Add the following Sections 9.5.1.8 and 9.5.1.9

9.5.1.8 failure of the Construction Manager to comply with any laws and regulations that protect the environment or human health and safety that are applicable to the Work, and

9.5.1.9 failure to comply with Missouri's Prevailing Wage Laws.

Add the following language to 9.5.2:

If the above reasons are not remedial within Contract time limits, and/or 30 days after date of Substantial Completion (or a different number of days as may be stipulated in the Contract, Contract Form, or Certificate of Substantial Completion,) the Owner may apply the unpaid balance of the Contract toward payment of any damages, liquidated damages, warranty insurance, cost to complete the work and/or remedy defective work, expenses and consultant fees resulting from any of the above which the Owner may incur.

Add Section 9.8.2.1 to Section 9.8.2:

9.8.2.1 The list of incomplete items (typically referred to as a "punch list"), may be attached to the Substantial Completion form, and provided that no incomplete item will prevent the Owner's use of the space/facility as it is intended to be used, including life safety components. Additional observations by the Architect to omit items from the list may be limited by requirements of Sections 012900 and 017700. After issuance of Substantial Completion and "punch list", subsequently discovered items which are not complete, and/or in nonconformance with the Contract, may be added to the list until such time as Final Completion and Final Payment. At the discretion and judgment of the Architect, a subsequent item may be classified as warranty work, if such item is ordinarily a warranty item and is not likely to result in significant cost or claims or damages to rectify the item. Refer to 9.3.1.1 of Supplemental Conditions for requirements for retainage and payments.) Final payment and/or exclusion of any item from a "punch list", shall not relieve the Construction Manager of the obligation to fulfill all requirements of the Contract.

Add Section 9.8.3.1 to Section 9.8.3:

9.8.3.1 The Architect will perform no more than two (2) inspections to determine whether the Work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Construction Manager for amounts paid to the Architect for any additional inspections.

Add Section 9.10.1.1 to Section 9.10.1:

9.10.1.1 The Architect will perform no more than two (2) inspections to determine whether the Work or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner is entitled to reimbursement from the Construction Manager for amounts paid to the Architect for any additional inspections.

Add Section 9.11 to Article 9:

9.11 The Construction Manager and the Construction Manager's surety, if any, shall be liable for and shall pay the Owner the sums hereinafter stipulated as liquidated damages, and not as a penalty, for each calendar day of delay after the date established for Substantial Completion in the Contract Documents until the Work is substantially complete.

ARTICLE 10 – PROTECTION OF PERSONS AND PROPERTY

Add Section 10.2.4.1 to Section 10.2.4:

10.2.4.1 When use or storage of explosives, or other hazardous materials, substances or equipment, or unusual methods are necessary for execution of the Work, the Construction Manager shall give the Owner reasonable advance notice. The Construction Manager shall handle such materials in an appropriate manner. This does not relieve the Construction Manager of the responsibility and liability for the appropriate handling of hazardous materials.

Add Section 10.2.4.2 to Section 10.2.4:

10.2.4.2 If the Contract Documents require the Construction Manager to handle materials or substances that under certain circumstances may be designated as hazardous, the Construction Manager shall handle such materials in an appropriate manner

ARTICLE 11 – INSURANCE AND BONDS

Delete the semicolon at the end of Section 11.1.1.1 and add:
, including private entities performing Work at the site and exempt from the coverage on account of number of employees or occupation, which entities shall maintain voluntary compensation coverage at the same limits specified for mandatory coverage for the duration of the Project;

Delete the semicolon at the end of Section 11.1.1.2 and add:
or persons or entities excluded by statute from the requirements of Section 11.1.1.1 but required by the Contract Documents to provide the insurance required by that section;

Add the following new paragraphs to Article 11:

CONSTRUCTION MANAGERS INSURANCE REQUIREMENTS (supplements Article 11 of AIA Document A201, 2007 Edition and other forms) THESE SPECIFICATIONS APPLY TO ALL CONSTRUCTION MANAGERS WHO WILL BE ON THE JOBSITE, WHETHER A CONSTRUCTION MANAGER, CONTRACTOR, OR ANY SUBCONTRACTOR.

INSURANCE: Construction Manager shall, at its expense, procure and maintain at a minimum for the duration of the Project and through the correction period stated in the agreement, except as otherwise set forth herein, the types and amounts of insurance described below or as otherwise required by law on all of its operations, in companies registered to do business in the State of Missouri and having an A.M. Best Rating of A- IX or higher:

Workers' Compensation and Employers Liability Insurance. Construction Manager shall carry Workers' Compensation Insurance as required by any applicable law or regulation. Employers Liability Insurance shall be in amounts no less than $1,000,000 each accident for bodily injury, $1,000,000 for bodily injury by disease and $1,000,000 each employee for bodily injury by disease. If there is an exposure of injury to Construction Manager's employees under the U.S. Longshoremen's and Harbor Workers Compensation act, the Jones Act or under laws, regulations or statutes applicable to maritime employees, coverage shall be included for such injuries or claims. If the Construction Manager's Employers Liability limits are below those stated above an umbrella liability policy may be used to the requested limit.

Commercial General Liability Insurance Construction Manager shall carry Commercial General Liability Insurance written on ISO occurrence form CG 00 01 07 98 or later edition (or a substitute form providing equivalent coverage) and shall cover all operations by or on behalf of the Construction Manager, providing insurance for bodily injury liability and property damage liability for the limits indicated below and for the following coverage:

(1) Premises and Operations
(2) Products and Completed Operations
(3) Contractual Liability insuring the obligations assumed by the Construction Manager under this Contract.
Personal Injury Liability and Advertising Injury Liability

Except with respect to bodily injury and property damage included within the products and completed operations hazards, the general aggregate limit shall apply separately to the Construction Manager's project under this Contract. Completed Operations coverage must be maintained for the correction period provided by the agreement.

Limit of Liability. The Commercial General Liability policy limits shall not be less than:
$1,000,000 Each Occurrence (Combined Single Limit for Bodily Injury and Property Damage)
$2,000,000 Aggregate for Products/Completed Operations
$1,000,000 Personal Injury/Advertising Injury
$2,000,000 General Aggregate (provide endorsement ISCO CG 25 03 or equivalent to apply the General Aggregate per project, if available. If not, see Umbrella Liability section.)

Additional Insured The Owner, all of its officers, directors and employees, and architect shall be named as Additional Insureds under the Commercial General Liability Insurance using ISO Additional Insured Endorsements CG 20 10 (2004 edition) or substitute providing equivalent coverage. If additional insured status is required for a correction period then CG 20 37 (2004 edition) or equivalent should also be used. These endorsements must be

stated on the insurance certificate provided to the Owner and a copy of the endorsements confirming coverage should accompany the insurance certificate.

Primary Coverage The Construction Manager's Commercial General Liability Policy shall apply as primary insurance and any other insurance carried by the Architect or the Owner shall be excess only and will not contribute with Construction Manager's insurance. This must be stated on the insurance certificate and a copy of the endorsement confirming coverage should accompany the insurance certificate.

Business Automobile Liability Insurance The policy should be written on ISO form CA 0001, CA 0005, CA 0002, CA0020 or a substitute form providing equivalent coverage and shall provide coverage for all owned, hired and non-owned vehicles. The limit of liability should be at least $1,000,000 Combined Single Limit for Bodily Injury and Property Damage each accident and should also cover Automobile Contractual Liability. The policy should name the Owner and all of its officers, directors and employees, and architect as Additional Insureds. The policy shall be endorsed to be primary coverage and any other insurance carried by the Owner shall be excess only and will not contribute with Construction Manager's insurance. To confirm coverage, a copy of the Additional Insured Endorsement and the Primary Insurance Endorsement should accompany the insurance certificate.

Umbrella Excess Liability. The Construction Manager should provide an umbrella excess liability policy that will provide a minimum of $3,000,000 per occurrence/$3,000,000 aggregate over the employers liability, commercial general liability and automobile liability coverages. This policy should "follow-form" of the underlying policies and comply with all insurance requirements of those policies. If the General Aggregate of the Commercial General Liability policy does not apply per project, the limits should be $4,000,000 per occurrence/$4,000,000 aggregate.

Waiver of Subrogation The Commercial General Liability and Automobile Liability policies shall each contain a waiver of subrogation in favor of the Architect, Owner and its officers, directors and employees.

Certificates of Insurance As evidence of the insurance, limits and endorsements required, a standard ACORD or equivalent Certificate of Insurance executed by a duly authorized representative of each insurer shall be furnished by the Construction Manager to the Owner and Architect before any Work under the Contract is commenced by the Construction Manager. Owner shall have the right, but not the obligation, to prohibit Construction Manager or any SubConstruction Manager from entering the Project site until such certificates are received and approved by the Owner. With respect to insurance to be maintained after final payment, an additional certificate(s) evidencing such coverage shall be promptly provided to Owner as a precondition to final payment. The Certificate of Insurance shall provide that there will be no cancellation or reduction of coverage without 30 days prior written notice to the Owner. Failure to maintain the insurance required herein may result in termination of the Contract at Owner's option. In the event the Construction Manager does not comply with the requirements of this section, the Owner shall have the right, but not the obligation, to provide insurance coverage to protect the Owner and Architect, and charge the Construction Manager for the cost of that insurance. The required insurance shall be subject to the approval of the Architect, but any acceptance of insurance certificates by the Architect or Owner shall in no way limit or relieve the Construction Manager of their duties and responsibilities in this Agreement.

Copies of Policies. Construction Manager shall furnish a certified copy of any and all insurance policies required under this Contract within ten (10) days of Owner's written request for said policies.

SubConstruction Managers Construction Manager shall cause each SubConstruction Manager to purchase and maintain insurance of the types and amounts specified herein. Limits of such coverage may be reduced only upon written agreement of Owner. Construction Manager shall provide to Owner copies of certificates evidencing coverage for each SubConstruction Manager. SubConstruction Managers' commercial general liability and business automobile liability insurance shall name Owner and Architect as Additional Insureds and have the

Waiver of Subrogation endorsement added.

Other Insurance. The Owner may require insurance coverage in excess of the types and amounts required in this Exhibit. Construction Manager shall attempt in good faith to obtain quotes for such additional coverage and provide them to Owner for review. Construction Manager shall purchase any such additional insurance as may be requested by the Owner in writing. Owner shall pay any additional premium for such additional coverage.

Builders Risk: Provided by the GC for the amount up to the contract for new work in place, stored material, and property damage and add full replacement cost of building plus stored or in transit materials.

Add the following new paragraph 11.1.5:
11.1.5 The Construction Manager's insurance policies shall name both the Architect and the Owner as additional insured. All insurance policies shall provide that no cancellation of the policy or endorsement shall be effective until the tenth day following the mailing (by certified or registered mail return receipt requested) of written notices of such cancellation to the Architect and to the Owner.

Modify the first sentence of Section 11.3.1 as follows: Delete “Unless otherwise provided, the Owner” and substitute “The Construction Manager.” Add the following sentences:
If the Owner is damaged by the failure of the Construction Manager to purchase and maintain such insurance without so notifying the Owner in writing, then the Construction Manager shall bear all reasonable costs attributable thereto.

Delete 11.3.1.2.

Modify Section 11.3.1.3 by Substituting “Construction Manager” for “Owner”.
Delete 11.3.4.

Modify 11.3.6 by making the following substitutions:
In the first sentence, substitute “Construction Manager” for Owner and “Owner” for “Construction Manager” and Substitute “Owner” for “Construction Manager” at the end of the last sentence.

Modify 11.3.7 by substituting “Construction Manager” for “Owner” at the end of the first sentence.

Modify 11.3.8 by substituting “Construction Manager” for “Owner”; except that at the first reference to :Owner in the first sentence, the work “this should be substituted for “Owner’s”.

Modify 11.3.9 by substituting “Construction Manager” for “Owner” each time the latter word appear except in the last sentence.

Modify 11.3.10 by substituting “Construction Manager” for “Owner” each time the latter word appears.

Delete Section 11.4.1 and substitute the following:
11.4.1 The Construction Manager shall furnish bonds covering faithful performance of the contract and payment of obligations arising thereunder. Bonds may be obtained through the Construction Manager’s usual source and the cost thereof shall be included in the Contract Sum. The amount of each bond shall be equal to 100 percent of the Contract Sum.
11.4.1.1 The Construction Manager shall deliver the required bonds to the Owner not later than three days following the date the Agreement is entered into, or if the Work is to be commenced prior thereto in response to a letter of intent, the Construction Manager shall, prior to the commencement of the Work, submit evidence satisfactory to the Owner that such bonds will be furnished.

11.4.1.2 The Construction Manager shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of power of attorney.

ARTICLE 12 – UNCOVERING AND CORRECTION OF WORK

Add the following Section 12.2.2.4 to Section 12.2.2:

12.2.2.4 Upon request by the Owner and prior to the expiration of one year from the date of Substantial Completion, the Architect will conduct and the Construction Manager shall attend a meeting with the Owner to review the facility operations and performance.

ARTICLE 15 – CLAIMS AND DISPUTES

Add Sections 15.1.5.3 and 15.1.5.4 to Section 15.1.5:

15.1.5.3 Claims for increase in the Contract Time shall set forth in detail the circumstances that form the basis for the Claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of delay ceased to affect the progress of the Work and the number of days' increase in the Contract Time claimed as a consequence of each such cause of delay. The Construction Manager shall provide such supporting documentation as the Owner may require including, where appropriate, a revised construction schedule indicating all the activities affected by the circumstances forming the basis of the Claim.

15.1.5.4 The Construction Manager shall not be entitled to a separate increase in the Contract Time for each one of the number of causes of delay which may have concurrent or interrelated effects on the progress of the Work, or for concurrent delays due to the fault of the Construction Manager.

Add the following sentence to Section 15.1.6:

If, before expiration of 30 days from the date of execution for this Agreement, the Owner obtains by separate agreement and furnishes to the Construction Manager a similar mutual waiver of all claims from the Architect against the Construction Manager for consequential damages which the Architect may incur as a result of any act or omission of the Owner or Construction Manager, then the waiver of consequential damages by the Owner and Construction Manager contained in this Section

15.1.6 shall be applicable to claims by the Construction Manager against the Architect.

END OF SECTION 000800

Front End

01/02/2020

MCPL - Work Package 10 - Colbern Road

MCPL - WP10 Colbern Road

Owner

MID-CONTINENT PUBLIC LIBRARY
15616 E 24 HWY
INDEPENDENCE, MO 64050-2057

Architect

SAPP DESIGN ASSOCIATES ARCHITECTS PC
3750 S FREMONT AVE
SPRINGFIELD, MO 65804-4217

Construction Manager

J.E. Dunn Construction Company
1001 Locust St.
Kansas City, MO 64106
Bobby Miller
816-283-9056

SECTION 00 01 10
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SECTION 00 11 16
INVITATION TO BID

[[DATE_OF_INVITATION]]

Re: MCPL - Work Package 10 - Colbern Road
1000 NE Colbern Rd, Lee's Summit, MO 64086

Ladies and Gentlemen:

J.E. Dunn Construction Company, hereafter referred as the **Contractor**, has issued bid documents for the project described below and requests your bid proposal on the Scopes of Work identified in this Front End.

The following list highlights information associated with the Project that may be helpful in your bidding process. Bidders should review the Bidding Documents in their entirety for a complete discussion of the items highlighted below.

PROJECT NAME	MCPL - Work Package 10 - Colbern Road
PROJECT DESCRIPTION	33,000SF new build library branch for the Mid-Continent Public Library System. Existing structure to be removed.
PRE-BID CONFERENCE	No Pre-Bid Conference will be held for this project. Please contact Bobby Miller with any questions regarding this project.
BIDDING DOCUMENTS	Bidding Documents are available on SmartBidNet. Bidding Documents may be viewed, by appointment, at JE Dunn's office located at 1001 Locust St.: Please contact Kim White at 816-426-8848.
BID PROPOSAL	Use the Bid Proposal Form in Section 00 41 23.
BID DUE DATE	Bids will be received until 10:00 AM on January 23, 2020. Please direct all Bids to the attention of Bobby Miller at bobby.miller@jedunn.com.
LENGTH OF VALIDITY OF BID	All Bids shall be valid for acceptance by the Contractor for a period of **Forty-Five (45) calendar days** after submission of the Bid(s).
INTERPRETATION AND ADDENDA	Requests for interpretations, clarifications, corrections or changes of the Bidding Documents must be made in writing at least **seven (7) calendar days** prior to the date for receipt of Bids. No Addenda will be issued later than **two (2) business days**prior to the date for receipt of Bids except for the limited situations set forth in the Instructions to Bidders.
SUBSTITUTIONS	Substitutions will be allowed as provided in the Instructions to Bidders and pursuant to Division 01.
INSURANCE REQUIREMENTS	Insurance requirements are included in the Subcontract, M&E Contract and/or Controlled Insurance Manual included herein. **Subcontractors will not be allowed on site until they have fully complied with the insurance requirements.**
PREVAILING WAGES	Prevailing wages are required on this Project.

MBE/WBE GOALS	MBE/WBE goals are required on this Project. Certified Companies to submit documentation with Bid Form.
TAXES/EXEMPTIONS	This Project is exempt from state sales and use tax. See Instructions to Bidders for more information.
OTHER SPECIAL REQUIREMENTS	Contractors to comply with Owner specific requirements as detailed on 00 73 00 - Special Requirements.
QUESTIONS	All questions regarding this Division 00 should be directed to the Contractor.

Please refer to the Instructions to Bidders for further information. All Bids are to be in strict accordance with the Bidding Documents and all related Bidding Requirements and Subcontract Documents.

BID DOCUMENTS:

Contractor reserves the right to reject any or all bids, waive any irregularities or award the work to someone other than the low Bidder.

We look forward to receiving your Bid(s). If you have any questions or require further assistance, please contact the undersigned.

Sincerely,

Bobby Miller

J.E. Dunn Construction Company

cc: File

SECTION 00 21 13
INSTRUCTIONS TO BIDDERS

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I. GENERAL

A. The Project is being constructed through a design-bid-build delivery method where the work will be subcontracted and coordinated by the Contractor.
B. Selected Subcontractors and Suppliers have been invited to submit a Lump Sum Bid for the construction of the Work described in the Bidding Documents.
C. Bidders are required to study carefully and conform to these instructions in order that their Bid(s) be complete, responsive and acceptable.

II. DEFINITIONS

I. Addenda are written or graphic instruments issued by the Architect prior to the execution of the Subcontract which modify or interpret the Bidding Documents by addition, deletion, clarification or correction

A. An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from the

amount of the Base Bid if the corresponding change in the Work, as described in the Bidding Documents and the Specifications, is accepted by the Owner

B. The Architect is the architectural firm identified herein which has entered into a contractual agreement with the Owner to provide certain design services for the Project. The term Architect shall also refer to its sub-consultants.
C. The Base Bid is the amount stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents as the base, to which Work may be added or deleted for amounts stated in Alternate Bids and Unit Prices.
D. A Bid is an offer of a Bidder submitted on the prescribed form contained in the Bidding Documents or a complete and properly signed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.
E. A Bidder is a person or entity who submits a Bid for the labor and material described in the Scope of Work set forth in the Bid Proposal.
F. Bidding Documents include the Bidding Requirements, the Subcontract Documents and the other documents included or identified in the Project Manual that could impact a Bid.
G. The Bidding Requirements consist of the Invitation to Bid, Instructions to Bidders and other sample bidding and other forms contained in the Project Manual and all Addenda describing the bidding process.
H. Contractor, whether as a General Contractor or Construction Manager at Risk, shall refer to the contractor named in the Invitation to Bid which has entered into an agreement with Owner to provide construction services on the Project.
I. The Scope of Work is the Work described and identified for a specific aspect of the Project.
J. The Subcontract Documents consist of the form of Agreement between the Owner and Contractor (“Prime Contract”), form of Agreement between Contractor and Subcontractor (“Subcontract”) or Material & Equipment Contract form (“M&E Contract”), General Conditions, Supplementary Conditions, Drawings, Specifications, all Addenda issued prior to execution of the Subcontract and other documents identified in the Subcontract or M&E Contract.
K. Subcontractor shall refer to the entity that will enter into a contractual agreement with the Contractor to provide labor and material for a particular Scope of Work.
L. The Successful Bidder is the responsible Bidder who submits the lowest and best Bid responsive to the Bidding Requirements and to whom the Contractor, on the basis of the Contractor’s evaluation, will make an award of Subcontract.
M. Supplier shall refer to the entity that will enter into a contractual agreement with the Contractor to supply material and/or equipment for the Project.
N. A Unit Price is an amount stated in the Bid as a price per unit of measurement for material, equipment or labor as described in the Bidding Documents.
O. The Work means the construction and services required by the Subcontract Documents including all labor, material, equipment and services provided or to be provided by the Subcontractor to fulfill the Subcontractor’s obligation under the Subcontract Documents.
P. The word furnish when used means furnish completely, including all work and associated costs for: materials, shop drawings, transportation, insurance, field measurements, expediting, shipping, handling, packaging, storage, touch up materials, owners manuals, training, and any other accessories required for a complete installation. Shipping methods and delivery dates for furnished items shall be coordinated with the receiver/ installer and shall include all reasonable provisions required for unloading. (Proper container, lift gate if required.)
Q. The word install when used means install completely, including all work and associated costs

for: receiving, unloading, unpacking, verification of quantity and condition, inventorying, hoisting, rigging, equipment, lifts, storage, hangers, supports, sleeves, coordination, layout, shop drawings, review of shop drawings by others, field measurements, excavation, backfill, dewatering, installation, cutting and patching, firestopping, daily clean up, inspections, documentation, protection of own work and work of others, rough-in, testing, as-built drawings, and all other accessories, services and facilities required for a complete installation. Repair or replace items damaged, misplaced, stolen, or otherwise deemed unfit for installation as determined by the Architect after proper inventorying of materials and/or equipment supplied by others.

R. The word provide when used means furnish and install completely, including all work and associated costs for: furnishing, installing, materials, labor, equipment, layout, tools, and any other temporary or permanent facilities required to complete the work.

S. Terms of art and other words not specifically defined herein have the same meaning as those used and/or defined in the Subcontract Documents.

III. THE BIDDING DOCUMENTS

A. Bidders shall use complete sets of Bidding Documents in preparing Bids. Neither the Owner, the Contractor, nor the Architect shall assume any responsibility for errors, mistakes, misrepresentations or incomplete bids resulting from the use of incomplete sets of Bidding Documents.

B. In making copies of the Bidding Documents available, the Owner, Architect and Contractor do so only for the purpose of obtaining Bids on the Scopes of Work and do not confer a license or grant permission to use the Bidding Documents for any other purpose.

IV. EXAMINATION OF BIDDING DOCUMENTS AND SITE

A. It is the responsibility of each Bidder, before submitting a Bid, to:

1. carefully study and compare the Bidding Documents with each other, and with other work being bid concurrently or presently under construction to the extent that it relates to the Scope of Work for which the Bid is submitted,
2. visit and examine the Project site to become familiar with local conditions that may effect cost, progress, performance or furnishing of the services or Work;
3. consider federal, state and local laws and regulations that may affect cost, progress, performance or furnishing of the services or Work; and
4. notify the Contractor immediately of all conflicts, errors, inconsistencies or ambiguities discovered by Bidder in the Bidding Documents.

B. Site Information

1. Within the Bidding Documents, there **may** be reports of explorations and tests of subsurface conditions at or contiguous to the site of the Project (“Geotechnical Reports”). If Geotechnical Reports are not included in the Bidding Documents, they will be made available to Bidders upon request. It is strongly recommended that those who are bidding on a Scope of Work which may be impacted by subsurface conditions obtain and/or review the Geotechnical Reports.
2. The Bidding Documents **may** identify reports and/or drawings relating to Asbestos, PCB, Petroleum, Hazardous Waste, Radioactive Material or other hazardous materials (“Hazardous Materials”). Copies of these reports and drawings will be made available to Bidders upon request. Provisions relating to responsibilities for such conditions are set forth in the Subcontract Documents.
3. These reports, drawings and other documents referenced in this section are not part of the

Subcontract Documents. The Bidder is responsible for any interpretation, extrapolation or conclusion it draws from any technical data or any other data, interpretations, opinions or information contained in such reports or drawings or shown or indicated in other documents related to subsurface conditions or Hazardous Materials.

C. Upon reasonable notice, Contractor and/or Owner will provide each Bidder access to the site to conduct such examinations, inspections and studies as each Bidder deems necessary for submission of a Bid.

V. **INTERPRETATIONS AND ADDENDA**

A. All questions regarding the meaning or intent of the Bidding Documents are to be directed to the Contractor who will forward such questions to the Architect, if needed.

B. Bidders shall promptly notify the Contractor of any ambiguity, inconsistency or error which they discover upon examination of the Bidding Documents, the Project site and the local conditions.

C. Bidders requiring interpretation, clarification, correction or change of the Bidding Documents shall make a written request which must reach the Contractor within the time set forth in the Invitation to Bid.

D. Requests received less than the time set forth in the Invitation to Bid **may** not be answered.

E. Interpretations, clarifications, corrections and changes to the Bidding Documents considered necessary by the Contractor or Architect in response to such questions or otherwise will be made by Addenda.

F. No Addenda will be issued later than the time set forth in the Invitation to Bid except for an Addendum withdrawing the request for Bids or postponing the date for receipt of Bids.

G. Reasonable efforts will be made to fax or deliver notifications of Addenda to all who are known to have received a complete set of Bidding Documents.

H. Copies of Addenda will be made available for inspection wherever Bidding Documents are on file for that purpose.

I. It is the responsibility of each Bidder to ascertain and confirm, prior to submitting a Bid, that the Bidder has received all Addenda. Each Bidder shall also acknowledge its receipt of all Addenda in its Bid(s). Owner, Contractor and Architect are not responsible for errors or omissions in Bids from Bidders who have not received all Addenda.

J. **Only interpretations, clarifications, corrections and changes made by formal written Addenda will be binding. Interpretations, clarifications, corrections and changes to the Bidding Documents made in any other manner will not be binding, and Bidders shall not rely upon them.**

K. In the case of an ambiguity, inconsistency or error in Bidding Documents not clarified by Addendum, the higher quality, more expensive option and/or greater quantity of Work shall be provided in accordance with the Contractor's interpretation.

L. Failure of the Bidder to notify the Contractor or Architect of a known ambiguity, inconsistency or error in the Bidding Documents will waive the Bidder's right to seek additional compensation for such ambiguity, inconsistency or error.

VI. **SUBSTITUTIONS**

A. Reference in the Specifications to any product, material, equipment, type or form of construction shall establish a minimum standard of quality and shall not be construed as limiting competition.

B. The products, materials and equipment described in the Bidding Documents establish a standard of required design, spare parts availability, strength, durability, usefulness, serviceability, operating cost, convenience, and for the purpose intended to be met by any proposed substitution.

C. Reference to standard specifications for basic materials shall not be modified for any substitutions proposed.
D. No request for substitution will be considered prior to receipt of Bids unless a written request for approval has been received by the Contractor or Architect within the time set forth in the Invitation to Bid. **Requests for substitution will not be considered when proposed with a Bid.**
E. Requests for substitutions will only be considered under the following procedures:
    1. The request is made under the "*or approved equal*" or the "*or approved substitute*" provisions of the Subcontract Documents.
    2. The request is received within the time period set forth in the Invitation to Bid.
    3. Each request includes the name of the material, product, equipment or system for which it is to be substituted, correlated to specification section and page; all basic data and characteristics of the proposed substitute so that a direct comparison may readily be made.
    4. The request complies completely with the other requirements for substitutions set form in Division 01.
F. It is the sole responsibility of the Bidder making the request to submit complete descriptive and technical information necessary for the Architect to evaluate the substitution.
G. The burden of proof of the merit of the proposed substitution is upon the Bidder making the request. **The Architect's decision of approval or disapproval of a proposed substitution shall be final.**
H. If the Architect approves a proposed substitution prior to receipt of Bids, such approval will be set forth by written Addendum. An approval of a request for substitution made in any other manner will not be binding, and Bidders shall not rely upon an approval made in any other manner.
I. No substitutions will be allowed subsequent to the Subcontract award unless specifically provided for in the Subcontract Documents.

VII. PRE-BID CONFERENCE

A. A pre-bid conference will be held at the date, time and location stated in the Invitation to Bid.
B. Representatives of Owner, Architect and Contractor will be present to discuss the Project and answer questions regarding the Bidding Documents and bidding procedure. Bidders are encouraged to attend and participate in the conference.

VIII. TIME AND PLACE TO RECEIVE BIDS

A. Contractor will receive Bids until the time on the date indicated in the Invitation to Bid or indicated by Addendum. Bids received after this time may not be accepted.
B. Bids shall be submitted at the place indicated in the Invitation to Bidders or indicated by Addendum. Bidders shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

IX. THE BID

A. Lump Sum Bids will be received from Bidders for the Scopes of Work identified in the Bidding Documents. Bids shall include all Work defined within the Scope of Work, including but not limited to the relevant Specification Section(s).
B. Bids are to include all overhead, profit, labor, applicable taxes, insurance, licenses, permits, tools, equipment, materials, services, labor, supervision and incidentals necessary or required for the completion of the Scopes of Work identified in the Bidding Documents.
C. No Bidder may submit more than one (1) Bid per Scope of Work. Multiple Bids for the same Scope of Work from an individual or entity under the same or different names will not be considered.

X. **PRE-QUALIFICATION OF BIDDERS**

A. All Bidders must be qualified to perform the Work described in the Bidding Documents. All Bidders must demonstrate their ability, experience, technical expertise, efficiency, integrity, reputation, capacity of personnel and financial resources to properly and timely perform the Work described in the Bidding Documents to be considered a responsible Bidder.

B. **To be qualified to perform the Work described in the Bidding Documents, the Bidder must submit and/or update the necessary information on Contractor's online Subcontractor Management System located at http://sms.jedunn.com.**

C. Only invited Bidders that are qualified may Bid the Project. The Contractor or Owner may reject proposals or Bids from non-invited and/or non-qualified firms. Contact Contractor for information regarding qualifying to Bid the Project.

XI. **BIDDER REPRESENTATIONS**

A. Each Bidder, by submitting its Bid, represents that:

1. The Bidder has examined, carefully studied and understands the Bidding Documents, including all Addenda and other related information, and its Bid is made in accordance therewith.
2. The Bidder has read and understands the Subcontract Documents to the extent that such documentation relates to the Scope of Work for which its Bid is submitted, and for other portions of the Project, if any, being bid concurrently or presently under construction.
3. The Bidder has visited the site, familiarized itself with the local conditions under which the Work is to be performed and has correlated its observations with the requirements of the proposed Subcontract Documents.
4. The Bidder is familiar with all federal, state and local Laws and Regulations that may affect cost, progress or performance of the Work.
5. The Bid is based upon materials, equipment and systems required by the Bidding Documents without exception unless otherwise approved.
6. The Bidder will not later request, and will not later expect to receive, additional payment for Work related to conditions which could have been determined by examination of the site and the Bidding Documents.
7. **The Bidder will agree to contract under the Subcontract Documents as provided (including project-specific modifications, if any, made at a later time) without clarification or modification.**

B. By submitting a Bid, Bidder agrees that any protest, controversy, dispute or claim arising from the Invitation to Bidders, the Bidder's submission of the Bid, the Owner's or Contractor's rejection of any Bid and/or the award of a Subcontract or M&E Contract shall be subject to the same dispute resolution requirements as are set forth in the Subcontract Documents, which are incorporated herein by this reference.

XII. **MODIFICATION AND WITHDRAWAL OF BIDS**

A. Bid may be modified or withdrawn any time prior to the time for receipt of Bids indicated in the Invitation to Bidders.

B. **Bids may not be withdrawn, modified or canceled for the period of time set forth in the Invitation to Bid following the time and date for the receipt of Bids.**

XIII. **REJECTION OF BIDS**

A. The Contractor and/or Owner reserve the right to reject any or all Bids, including, without limitation, the right to reject Bids that are incomplete, irregular, nonconforming, non-responsive, unbalanced or conditional.

XIV. **ACCEPTANCE OF BID (AWARD)**

A. It is the intent of the Contractor to award a Subcontract or M&E Contract to the lowest, responsible Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents.

B. In awarding the Subcontract or M&E Contract, the Contractor may take into consideration the Bidder's skill, facilities, capacity, experience, responsibility, previous work record and financial standing; and, the necessity of prompt and efficient completion of work herein described. The inability of any Bidder to meet the requirements mentioned above may be cause for rejection of the Bid.

C. The Contractor and/or Owner may interview any and all Bidders before the Subcontract or M&E Contract is awarded. The interview will enable the Contractor and Owner to ask the Bidder questions about materials, labor, duration, Scope of Work, the Subcontract Documents or the Bidder's qualifications and abilities.

D. The Contractor and Owner shall have the right to waive informality or irregularities in a Bid received and to accept the Bid which, in the their judgment, is in the Owner's and Contractor's best interest

E. The Owner and Contractor shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternate(s) accepted.

XV. **SCHEDULE**

A. The Bidder agrees that if awarded the Subcontract or M&E Contract it will substantially complete the Work in accordance with the schedule developed by the Contractor. A construction milestone schedule has been included in Section 00 31 13. A detailed project schedule is available at Contractor's office and is available for review by all Bidders.

B. The Bidder hereby agrees to commence work under the Subcontract or M&E Contract within **seven (7) calendar days** after the date of a "Notice to Proceed", unless otherwise stipulated in that notice.

XVI. **SUBCONTRACTOR DEFAULT**

A. Performance And Payment Bond

1. The Bidder shall indicate the actual cost to furnish bonds covering the faithful performance of this Subcontract and payment of all obligations arising thereunder. Bonds shall be issued by a surety company that is rated "A-" or better by A.M. Best Company. The surety shall have a per bond underwriting limit set forth in the most current United States Treasury Circular 570 List that is greater than or equal to the face value of the bond.
2. Bonds (if required) shall be written on forms approved by the Contractor. Bonds shall be written in full amount of the Contract Sum and shall name the Contractor as obligee. The approved bond form is included as Section 00 61 13.

B. Contractor will only pay for the actual cost of the bond based upon an invoice from the surety.

XVII. **INSURANCE**

A. The insurance requirements for the Project are set forth in the Subcontract or M&E Contract, the General Conditions and/or the Owner-Contractor Agreement.

B. In addition, all Bidders shall include the cost of complying with the safety requirements contained in the Project Insurance Manual

XVIII. **FORM OF AGREEMENT BETWEEN THE CONTRACTOR AND SUBCONTRACTOR**

A. The Agreement for the Work will be the Subcontract identified in the Bid Documents, as modified and amended, including all General, Supplemental or Special Conditions ("Subcontract"). See

Section 00 52 00.

B. **The Subcontract may be modified from the form included to reflect Project-specific provisions required by the Owner. Otherwise, the Subcontract shall not be changed from the form that is included. The Bidder shall include in its Bid all costs associated with executing the Subcontract as provided in Section 00 52 00.**

XIX. **FORM OF AGREEMENT BETWEEN THE CONTRACTOR AND SUPPLIER**

A. The agreement for the providing of material, goods or equipment will be the Material & Equipment Contract, including all General Supplemental or Special Conditions ("M&E Contract"). See Section 00 52 00.

B. **The M&E Contract may be modified from the form included to reflect Project-specific provisions required by the Owner. Otherwise, the M&E Contract shall not be changed from the form that is included. The Bidder shall include in its Bid all costs associated with executing the M&E Contract as provided in Section 00 52 00.**

XX. **LABOR HARMONY**

A. The Bidder hereby acknowledges that the Contractor may be a party to certain collective bargaining agreements with various union crafts, which agreements may affect the work of subcontractors while working on this project. Bidder agrees that, to the extent any such agreement is applicable to the on-site construction work performed by the Bidder on this Project, it shall take all steps necessary to comply with the subcontractor articles or other applicable provisions of the Contractor's collective bargaining agreements. If any portion of the Bidder's Work is further subcontracted, then second tier subcontractors shall be bound by and observe all terms and provisions of such collective bargaining agreements to the same extent as is hereby required of the Bidder.

B. Contractor is signatory to agreements with the following crafts:

1. Carpenters
2. Laborers
3. Operating Engineers
4. Cement Masons
5. Brick Masons
6. Ironworkers
7. Teamster

XXI. **SALES & USE TAX EXEMPTION**

A. Supplies, materials, goods and equipment incorporated into the Project are exempt from payment of State sales and use tax. Accordingly, all Bids shall not include sales and use tax.

B. Successful Bidders will be issued copies of the Tax Exemption Letter and Exemption Certificate issued by the [State] Department of Revenue with their Subcontract or M&E Contract. The Subcontractor/Supplier shall make copies of these documents and provide them to each vendor from whom the Subcontractor/Supplier purchases tangible personal and labor services sales tax exempt. The sales or compensating tax exemption number must be available to the vendor at the time the invoice is rendered or the exemption for sales or compensating tax cannot be claimed.

C. Upon completion of the Project the Subcontractor/Suppler shall furnish to the Owner a sworn statement, on a form to be provided by the director of taxation, that all purchases so made were entitled to exemption. All invoices shall be held by the Subcontractor/Supplier for a period of five (5) years and shall be subject to audit by the director of taxation.

D. Failure to use the granted tax exemption properly can result in civil and criminal penalties.

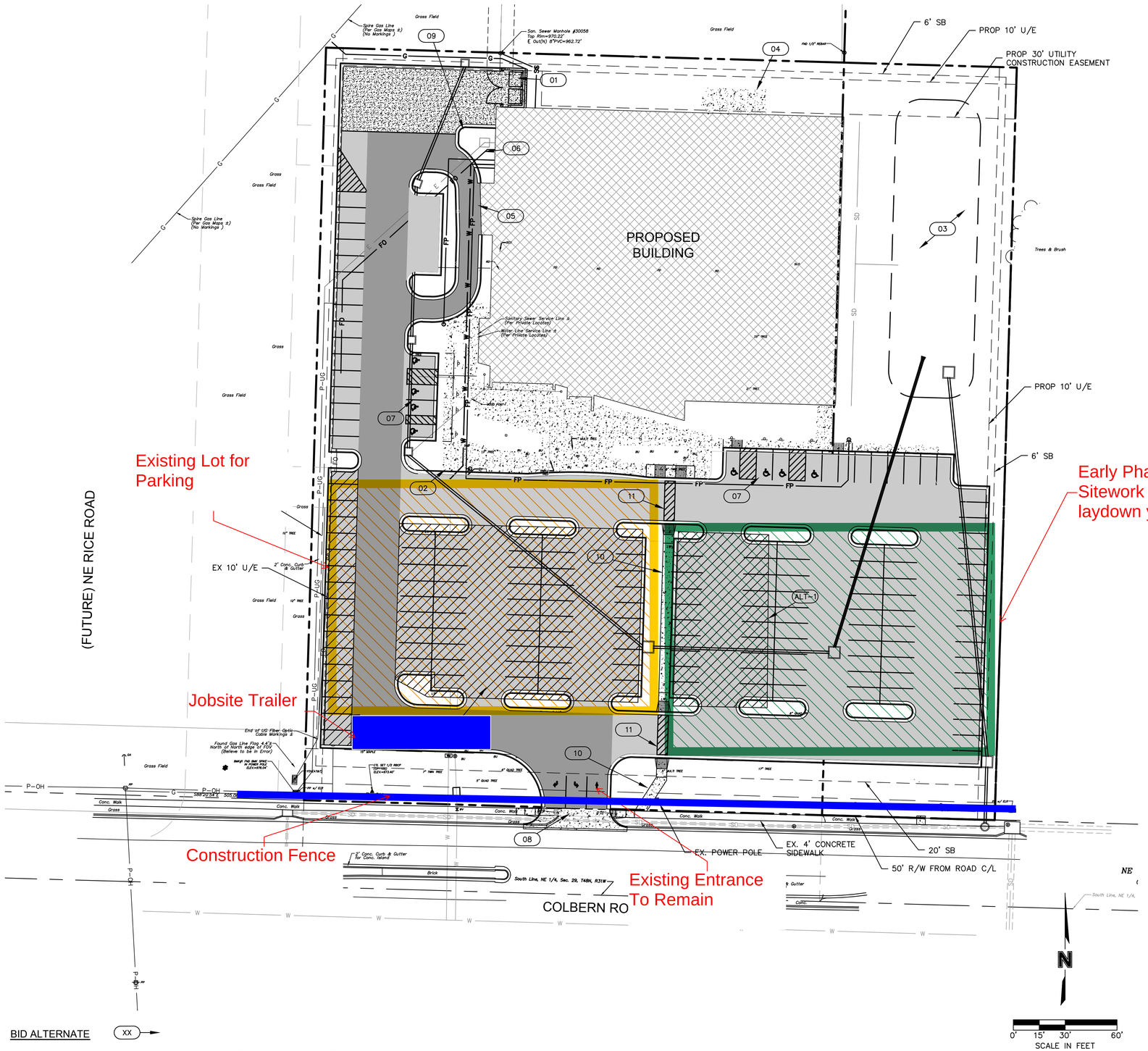
Subcontractor or Supplier hereby agrees to defend, indemnify and hold Contractor and Owner harmless from any loss, damage, cost or penalty assessed against them by the State of [State] arising from Subcontractor's or Supplier's improper implementation of the tax exemption granted to this Project.

XXII. **PREVAILING WAGE**

A. Bids shall be based on payment of wage rates not less than the prevailing hourly wage for each craft or classification of workmen engage on the Work as determined by the *Missouri Division of Labor Standards.*

B. See Section 00 73 43 for more information regarding prevailing wage requirements.

SECTION 00 30 00
SITE ACCESS PLAN



BID ALTERNATE

XX

ALT-1 SAVE EXISTING ASPHALT WITHIN THE AREAS NOTED WITH NEAT SAWCUTS. PERFORM 2" MILL ON EXISTING ASPHALT AND OVERLAY WITH 2" FINISH COURSE FOR ENTIRE PARKING AREA.

SITE DATA		
ZONING & SITE AREA		
PROPOSED USE:	PUBLIC LIBRARY	
SITE AREA		ZONING
LOT 2 (AS DECRIBED):	4.00 ACRES (174,237 SF)	CP-2
IMPERVIOUS:	2.58 ACRES (112,384 SF) (64%)	
PERVIOUS:	1.42 ACRES (61,855 SF) (36%)	
FAR (0.55 MAX):	0.15	
BUILDING AREA		
BUILDING TYPE	# STORIES	SQUARE FOOTAGE
BUILDING	1	34,030 SF
PARKING		
USE	REQUIRED	PROVIDED
LIBRARY	4 PER 1000 SF = 136	163
ADA	4 (PER CITY TABLE)	8
TOTAL	136	171 (INCLUDING ADA)

NOTE:
ACCORDING TO MDNR STATE OIL & GAS COUNSEL THERE ARE NO OIL AND GAS WELLS LOCATED WITHIN OR ADJACENT TO THE PROPERTY.

THERE ARE NO FEMA DELINEATED FLOODPLAINS ON THE PROPERTY.

LEGEND

- PROPERTY LINES
- RIGHT-OF-WAY LINES
- LOT LINES
- ROAD CENTERLINE
- EASEMENT LINES
- SETBACK LINES
- EXISTING GRADE CONTOURS
- PROPOSED GRADE CONTOURS
- OVERHEAD ELECTRIC
- UNDERGROUND ELECTRIC
- UNDERGROUND TELEPHONE
- UNDERGROUND FIBER OPTIC
- GAS LINE
- WATER LINE
- FIRE PROTECTION LINE
- STORM SEWER LINE
- SANITARY SEWER LINE
- ACCESSIBLE SIDEWALK RAMP
- CONCRETE CURB & GUTTER TYPE "B" RE: DETAILS
- CONCRETE CURB & GUTTER TYPE "B-DRY" RE: DETAILS
- PROPOSED CONCRETE SIDEWALK
- PROPOSED HEAVY DUTY CONCRETE PAVEMENT
- PROPOSED LIGHT DUTY ASPHALT
- PROPOSED HEAVY DUTY ASPHALT
- PROPOSED DETENTION BASIN

KEYNOTES:

XX

01	TRASH ENCLOSURE - CMU WALLS WITH BRICK FACING AND STEEL DOORS
02	BOOK DROP
03	EXTEND DRY DETENTION BASIN
04	CONCRETE PATIO
05	DRIVE-THRU WINDOW
06	POWER TRANSFORMER
07	ADA ACCESSIBLE SIGNAGE AND STRIPING
08	WIDENED COMMERCIAL ENTRANCE (40') WITH RECONSTRUCTED ADA RAMP
09	REMOTE FIRE DEPARTMENT CONNECTION
10	6' SIDEWALK
11	CROSSWALK STRIPING

LEGAL DESCRIPTION

All of Lot 1, Rice Acres, a subdivision in the City of Lee's Summit, JacksonCounty,Missouri, together with all that part of an unplatted trac t of land, all lying in the Northeast Quarter of Section 29, Township 48 North, Range 31 West, described by Timothy Blair Wiswell, MO-PLS 2009000067, as follows:

COMMENCING at the Southeast corner of the Northeast Quarter of Section 29, Township 48 North, Range 31 West; thence North 88 degrees 28 minutes 52 seconds West, on the South line of said Northeast Quarter, a distance of 755.18 feet to a point on the Southerly extension of the West line of Lot 1, Rice Acres, a subdivision in the City of Lee's Summit, Jackson County, Missouri; thence North 01 degree 23 minutes 04 seconds East, departing said South line, on said Southerly extension, a distance of 55.66 feet to the Southwest corner of said Lot 1, the POINT OF BEGINNING; thence North 01 degree 23 minutes 04 seconds East, on said West line, a distance of 436.21 feet to the Northwest corner of said Lot 1; thence South 88 degrees 38 minutes 41 seconds East, on the North line of said Lot 1 and its Easterly extension, a distance of 400.00 feet to a point; thence South 01 degree 23 minutes 04 seconds West, departing said Easterly extension, a distance of 436.21 feet to a point on the Easterly extension of the South line of said Lot 1; thence North 88 degrees 38 minutes 41 seconds West, on said Easterly extension and on said South line, a distance of 400.00 feet to the POINT OF BEGINNING, containing 174,485 Square Feet or 4.0056 Acres, more or less.

SAPP DESIGN ARCHITECTS
3750 S. Fremont Ave.
Springfield, MO 65804 417.877.9600
Sapp Design Associates Architects, P.C.
Missouri State Certificate of Authority #000607

helix.
1629 Walnut
Kansas City, MO 64108 816.300.0300

SPECIAL NOTICES

In the event the client consents to, allows, authorizes or approves of changes to any plans, specifications or other construction documents, and these changes are not approved in writing by the design professional, the client recognizes that such changes and the results thereof are not the responsibility of the design professional. Therefore, the client agrees to release the design professional from any liability arising from the construction, use or result of such changes. In addition, the client agrees to the fullest extent permitted by law, to indemnify and hold the design professional harmless from any damage, liability or cost (including reasonable attorney's fees and costs of defense) arising from such changes.

The personal seal of the registered Architect or Engineer shall be the legal equivalent of his signature wherever & wherever used, and the owner of the seal shall authenticate this sheet and the specification sections pertaining to this sheet. Responsibility shall be disclaimed for all other plans, specifications, estimates, reports or other documents or instruments relating to or intended to be used for any part or parts of the architectural project.

Mid-Continent Public Library
PRELIMINARY DEVELOPMENT PLANS FOR
COLBERN ROAD BRANCH
1000 N.E. COLBERN ROAD
LEE'S SUMMIT, MO 64086
JACKSON COUNTY

PACKAGE 10

Engineer of Record

BID SET
NOT FOR CONSTRUCTION

12.23.19

Terry M Parsons, Engineer MO PE-2018010505

olsson
7301 West 133rd Street, Suite 200
Overland Park, KS 66213
TEL 913.381.1170
FAX 913.381.1174
www.olssonassociates.com
Olsson
Missouri State Certificate of Authority #001592

Revision No.	Description	Date

Project No.	Date	Drawn
B18-0330	12-23-19	BK

Drawing No.

C2.0
GENERAL LAYOUT PLAN

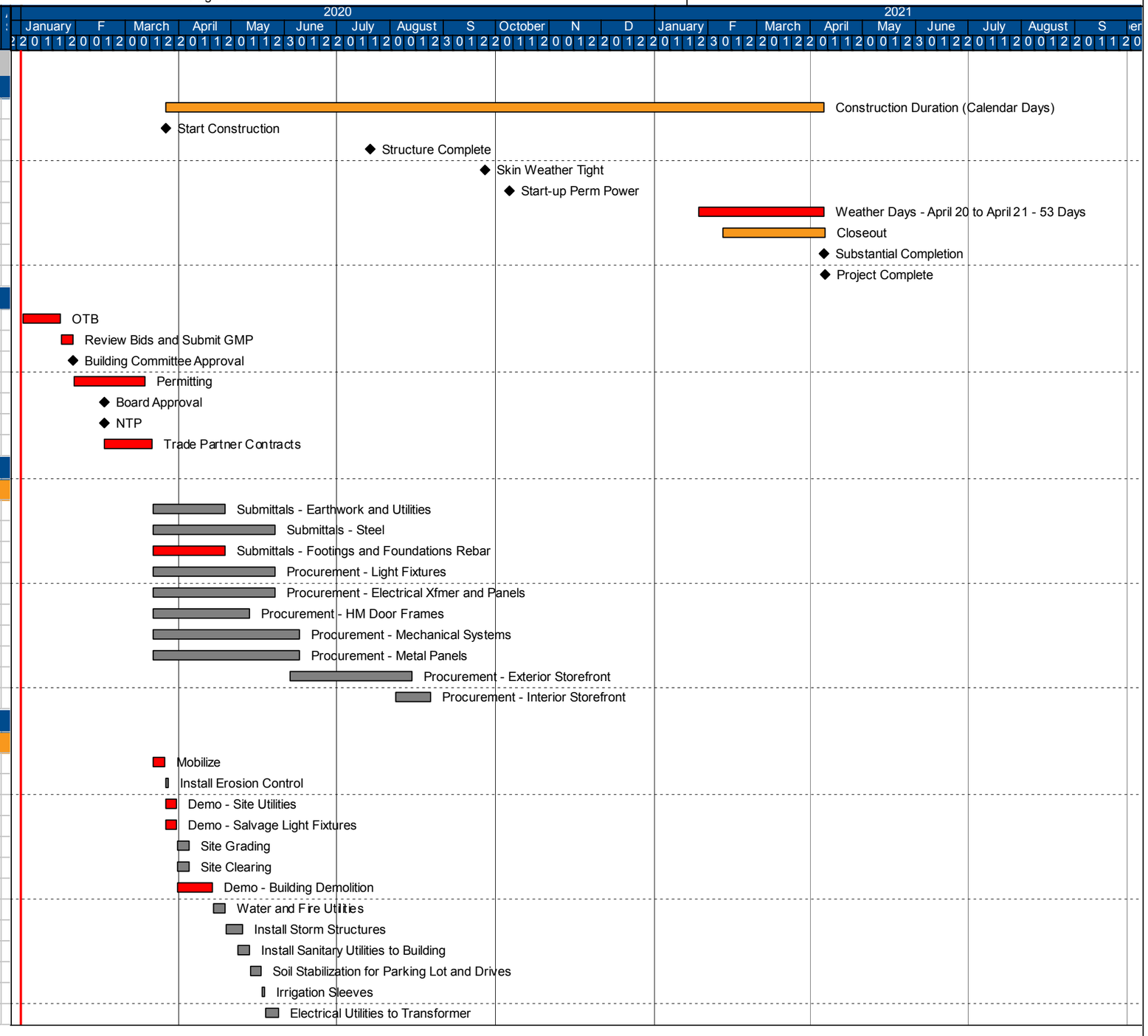
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DATE: Dec 20, 2019 12:17pm
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SECTION 00 31 13
MILESTONE SCHEDULE OF CONSTRUCTION

Bidders recognize that revisions in the planned schedule are inherent in the nature of construction. This may result in revisions to the schedule of construction for the Project and the Bidders' Work during the progress of construction. Bidders acknowledge that Owner or Contractor cannot guarantee Bidders, if selected, will be able to start the Work on any particular date or continue without interruption once started. Bidders shall include in their Bid all costs associated with this risk.

Activity ID	Activity Name	Orig Dur	Rem Dur	Start	Finish
Colbern Road					
Summary					
SUM-4640	Construction Duration (Calendar Days)	381	381	24-Mar-20	08-Apr-21
JED-0100	Start Construction	0	0	24-Mar-20	
JED-0200	Structure Complete	0	0		20-Jul-20
JED-0300	Skin Weather Tight	0	0		24-Sep-20
JED-0400	Start-up Perm Power	0	0	09-Oct-20	
CON-6000	Weather Days - April 20 to April 21 - 53 Days	53	53	26-Jan-21	08-Apr-21
SUM-4650	Closeout	60	60	09-Feb-21	09-Apr-21
JED-0600	Substantial Completion	0	0		08-Apr-21
SUM-5000	Project Complete	0	0		09-Apr-21
Preconstruction					
CON-4950	OTB	16	16	02-Jan-20*	23-Jan-20
CON-4970	Review Bids and Submit GMP	5	5	24-Jan-20	30-Jan-20
CON-5550	Building Committee Approval	0	0		30-Jan-20
CON-4940	Permitting	30	30	31-Jan-20	12-Mar-20
CON-5280	Board Approval	0	0	18-Feb-20*	
CON-4980	NTP	0	0	18-Feb-20	
CON-4990	Trade Partner Contracts	20	20	18-Feb-20	16-Mar-20
Procurement					
Submittals					
PROC-1060	Submittals - Earthwork and Utilities	30	30	17-Mar-20	27-Apr-20
PROC-1010	Submittals - Steel	50	50	17-Mar-20	26-May-20
PROC-1000	Submittals - Footings and Foundations Rebar	30	30	17-Mar-20	27-Apr-20
PROC-1100	Procurement - Light Fixtures	50	50	17-Mar-20	26-May-20
PROC-1110	Procurement - Electrical Xfmer and Panels	50	50	17-Mar-20	26-May-20
PROC-1120	Procurement - HM Door Frames	40	40	17-Mar-20	11-May-20
PROC - 1130	Procurement - Mechanical Systems	60	60	17-Mar-20	09-Jun-20
PROC - 1100	Procurement - Metal Panels	60	60	17-Mar-20	09-Jun-20
PROC-1080	Procurement - Exterior Storefront	50	50	04-Jun-20	13-Aug-20
PROC-1090	Procurement - Interior Storefront	15	15	04-Aug-20	24-Aug-20
Construction					
Early Site Work					
CON-1110	Mobilize	5	5	17-Mar-20	23-Mar-20
CON-5750	Install Erosion Control	2	2	24-Mar-20	25-Mar-20
CON-5960	Demo - Site Utilities	5	5	24-Mar-20	30-Mar-20
CON-5970	Demo - Salvage Light Fixtures	5	5	24-Mar-20	30-Mar-20
CON-5340	Site Grading	5	5	31-Mar-20	06-Apr-20
CON-1160	Site Clearing	5	5	31-Mar-20	06-Apr-20
CON-5980	Demo - Building Demolition	15	15	31-Mar-20	20-Apr-20
CON-5710	Water and Fire Utilities	5	5	21-Apr-20	27-Apr-20
CON-1180	Install Storm Structures	8	8	28-Apr-20	07-May-20
CON-5760	Install Sanitary Utilities to Building	5	5	05-May-20	11-May-20
CON-5470	Soil Stabilization for Parking Lot and Drives	5	5	12-May-20	18-May-20
CON-5730	Irrigation Sleeves	2	2	19-May-20	20-May-20
CON-5660	Electrical Utilities to Transformer	5	5	21-May-20	28-May-20



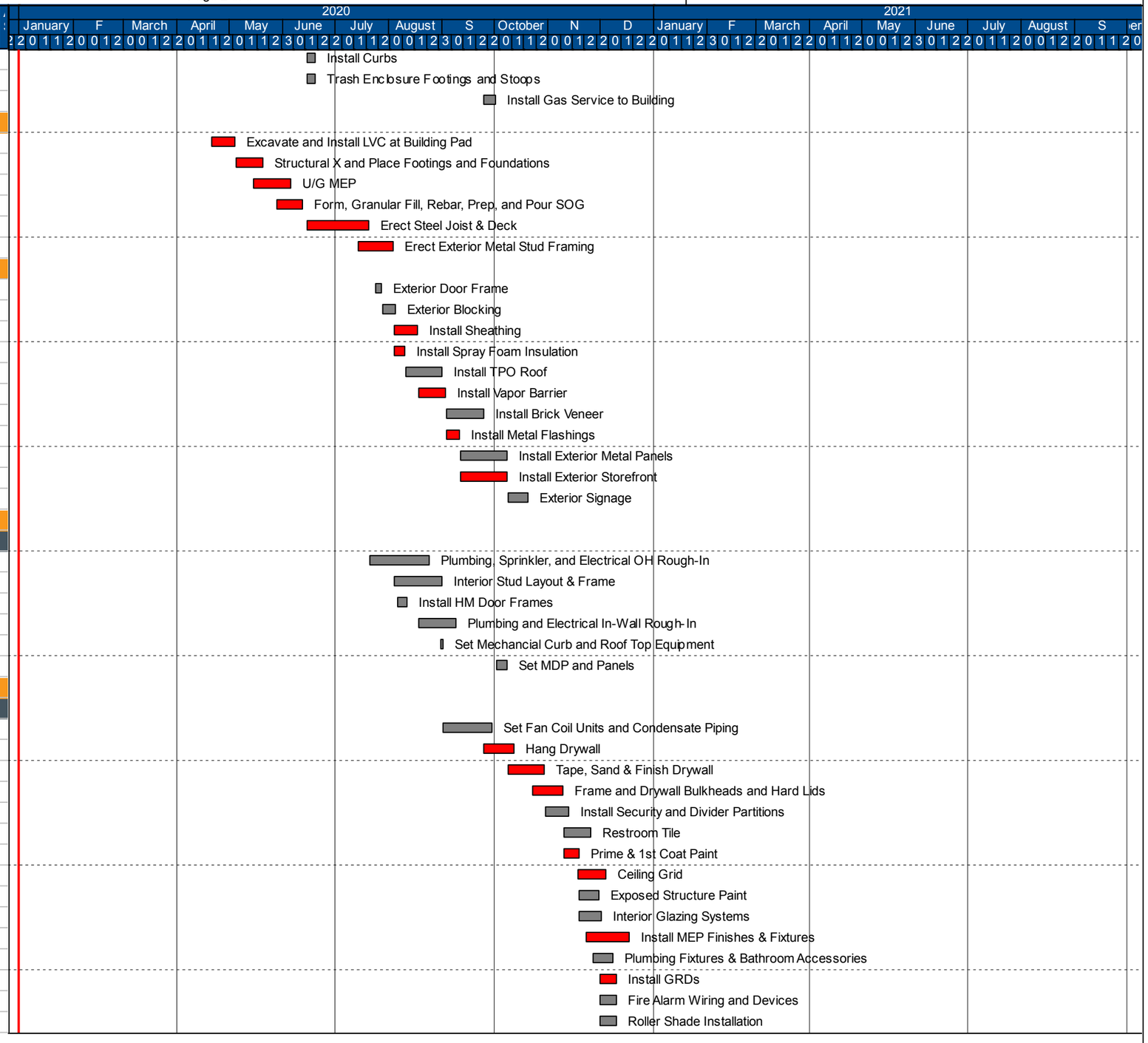
Remaining Level of Effort
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Actual Work
Critical Remaining Work

Run Date: 06-Jan-20

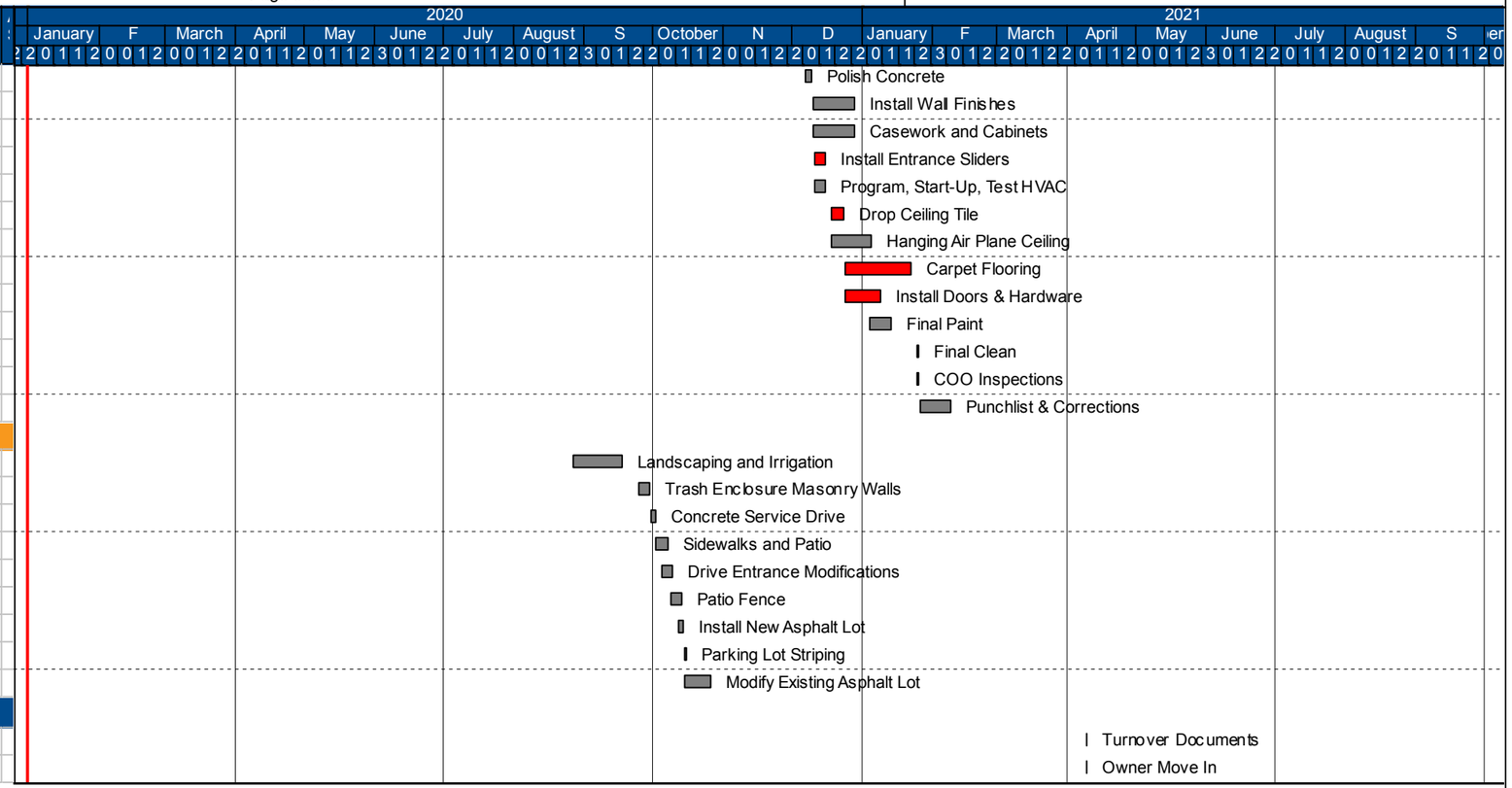
Colbern Road
JE Dunn Construction Company
01-Jan-20 Update Schedule

JE DUNN® CONSTRUCTION

Activity ID	Activity Name	Orig Dur	Rem Dur	Start	Finish
CON-5610	Install Curbs	5	5	15-Jun-20	19-Jun-20
CON-5680	Trash Enclosure Footings and Stoops	5	5	15-Jun-20	19-Jun-20
CON-5770	Install Gas Service to Building	5	5	25-Sep-20	01-Oct-20
Foundations & Structure					
CON-5630	Excavate and Install LVC at Building Pad	10	10	21-Apr-20	04-May-20
CON-1120	Structural X and Place Footings and Foundations	12	12	05-May-20	20-May-20
CON-4670	U/G MEP	15	15	15-May-20	05-Jun-20
CON-5640	Form, Granular Fill, Rebar, Prep, and Pour SOG	12	12	28-May-20	12-Jun-20
CON-4690	Erect Steel Joist & Deck	25	25	15-Jun-20	20-Jul-20
CON-1200	Erect Exterior Metal Stud Framing	15	15	14-Jul-20	03-Aug-20
Skin, Enclosure & Roof					
CON-5430	Exterior Door Frame	2	2	24-Jul-20	27-Jul-20
CON-5510	Exterior Blocking	6	6	28-Jul-20	04-Aug-20
CON-4330	Install Sheathing	10	10	04-Aug-20	17-Aug-20
CON-5780	Install Spray Foam Insulation	5	5	04-Aug-20	10-Aug-20
CON-4310	Install TPO Roof	15	15	11-Aug-20	31-Aug-20
CON-5500	Install Vapor Barrier	12	12	18-Aug-20	02-Sep-20
CON-5220	Install Brick Veneer	15	15	03-Sep-20	24-Sep-20
CON-5830	Install Metal Flashings	5	5	03-Sep-20	10-Sep-20
CON-5300	Install Exterior Metal Panels	20	20	11-Sep-20	08-Oct-20
CON-4910	Install Exterior Storefront	20	20	11-Sep-20	08-Oct-20
CON-5820	Exterior Signage	8	8	09-Oct-20	20-Oct-20
Rough-In					
Main Floor					
CON-4710	Plumbing, Sprinkler, and Electrical OH Rough-In	25	25	21-Jul-20	24-Aug-20
CON-4720	Interior Stud Layout & Frame	20	20	04-Aug-20	31-Aug-20
CON-5440	Install HM Door Frames	4	4	06-Aug-20	11-Aug-20
CON-4730	Plumbing and Electrical In-Wall Rough-In	15	15	18-Aug-20	08-Sep-20
CON-5190	Set Mechancial Curb and Roof Top Equipment	2	2	31-Aug-20	01-Sep-20
CON-5740	Set MDP and Panels	5	5	02-Oct-20	08-Oct-20
Finishes					
Main Floor					
CON-5850	Set Fan Coil Units and Condensate Piping	20	20	01-Sep-20	29-Sep-20
CON-4440	Hang Drywall	12	12	25-Sep-20	12-Oct-20
CON-4600	Tape, Sand & Finish Drywall	15	15	09-Oct-20	29-Oct-20
CON-6010	Frame and Drywall Bulkheads and Hard Lids	12	12	23-Oct-20	09-Nov-20
CON-6020	Install Security and Divider Partitions	10	10	30-Oct-20	12-Nov-20
CON-5330	Restroom Tile	12	12	10-Nov-20	25-Nov-20
CON-4450	Prime & 1st Coat Paint	7	7	10-Nov-20	18-Nov-20
CON-4460	Ceiling Grid	12	12	18-Nov-20	04-Dec-20
CON-5520	Exposed Structure Paint	7	7	19-Nov-20	30-Nov-20
CON-5650	Interior Glazing Systems	8	8	19-Nov-20	01-Dec-20
CON-4540	Install MEP Finishes & Fixtures	18	18	23-Nov-20	17-Dec-20
CON-4530	Plumbing Fixtures & Bathroom Accessories	8	8	27-Nov-20	08-Dec-20
CON-5870	Install GRDs	8	8	01-Dec-20	10-Dec-20
CON-5920	Fire Alarm Wiring and Devices	8	8	01-Dec-20	10-Dec-20
CON-5930	Roller Shade Installation	8	8	01-Dec-20*	10-Dec-20



Activity ID	Activity Name	Orig Dur	Rem Dur	Start	Finish
CON-5590	Polish Concrete	3	3	07-Dec-20*	09-Dec-20
CON-5530	Install Wall Finishes	12	12	10-Dec-20	28-Dec-20
CON-4500	Casework and Cabinets	12	12	10-Dec-20	28-Dec-20
CON-5580	Install Entrance Sliders	3	3	11-Dec-20	15-Dec-20
CON-5880	Program, Start-Up, Test HVAC	3	3	11-Dec-20	15-Dec-20
CON-4490	Drop Ceiling Tile	4	4	18-Dec-20	23-Dec-20
CON-5950	Hanging Air Plane Ceiling	10	10	18-Dec-20	04-Jan-21
CON-4510	Carpet Flooring	20	20	24-Dec-20	22-Jan-21
CON-4560	Install Doors & Hardware	10	10	24-Dec-20	08-Jan-21
CON-4550	Final Paint	8	8	04-Jan-21	13-Jan-21
CON-4580	Final Clean	1	1	25-Jan-21	25-Jan-21
CON-5910	COO Inspections	1	1	25-Jan-21	25-Jan-21
CON-4570	Punchlist & Corrections	10	10	26-Jan-21	08-Feb-21
Late Site Work					
CON-5110	Landscaping and Irrigation	15	15	27-Aug-20	17-Sep-20
CON-5690	Trash Enclosure Masonry Walls	3	3	25-Sep-20	29-Sep-20
CON-5790	Concrete Service Drive	3	3	30-Sep-20	02-Oct-20
CON-5100	Sidewalks and Patio	4	4	02-Oct-20	07-Oct-20
CON-5570	Drive Entrance Modifications	5	5	05-Oct-20	09-Oct-20
CON-5940	Patio Fence	3	3	09-Oct-20	13-Oct-20
CON-5600	Install New Asphalt Lot	3	3	12-Oct-20	14-Oct-20
CON-5120	Parking Lot Striping	1	1	15-Oct-20	15-Oct-20
CON-5990	Modify Existing Asphalt Lot	8	8	15-Oct-20	26-Oct-20
Closeout					
CLO-1000	Turnover Documents	1	1	09-Apr-21	09-Apr-21
CON-5060	Owner Move In	1	1	09-Apr-21	09-Apr-21



Remaining Level of Effort
Actual Level of Effort
Actual Work
Critical Remaining Work
Remai...
Milest...

Run Date: 06-Jan-20

Colbern Road
JE Dunn Construction Company
01-Jan-20 Update Schedule

JE DUNN® CONSTRUCTION

SECTION 00 41 23
BID PROPOSAL FORM

Owner: MID-CONTINENT PUBLIC LIBRARY **Project:** MCPL - Work Package 10 - Colbern Road **Project No.** 17050710

General Contractor: J.E. Dunn Construction Company **Attn:** Bobby Miller

Name of Bidder: _____

Address of Bidder: _____ **Phone of Bidder:** _____

Contact Name: _____ **Contact Email:** _____

BASE BID INDIVIDUAL SCOPES OF WORK

Directions: For individual Scopes of Work, list the Scope of Work number, the Scope of Work description and the Base Bid amount both in words and in figures for each Scope. These Base Bids are considered stand-alone Bids and could be awarded individually or in any combination.

Scope of Work No. and Description: _____

Base Bid (figures): $ _____

Base Bid (words): _____

Scope of Work No. and Description: _____

Base Bid (figures): $ _____

Base Bid (words): _____

Scope of Work No. and Description: _____

Base Bid (figures): $ _____

Base Bid (words): _____

Scope of Work No. and Description: _____

Base Bid (figures): $ _____

Base Bid (words): _____

Scope of Work No. and Description: _____

Base Bid (figures): $ _____

Base Bid (words): _____

COMBINATION BIDS

Directions: For combination Bids, list each Scope of Work number, the Scope of Work descriptions and the combination Bid amount both in words and figures for each Scope. **Any discounts due to the efficiencies of multi-scope award, should be considered here and reflected in the combination Bid. To be considered for a combination Bid award, individual Bids must be submitted for each Scope of Work.** If Bidder chooses to submit more than one combination Bid, submit additional Bid Forms.

Scope of Work No.	Scope of Work Description
Base Bid (figures):	$
Base Bid (words):	

Bid Proposal Amounts:

The undersigned, having examined the Bidding Documents and the site of the proposed Work and being familiar with all the conditions affecting the construction of the Project, including the availability of labor, equipment, and materials, hereby proposes and agrees to provide and furnish all labor, material, equipment, supervision, and other items necessary to perform and complete, in a workmanlike manner, all Work required by the Bidding Documents, at the prices stated below. Stated sums include fees, insurance, payroll taxes, materials, labor, and all charges that may be levied. This Bid also includes all applicable taxes, including sales tax, unless otherwise stated.

With respect to the Bid amount, the amount shall be shown in both words and figures. In the case of discrepancy between the words and the figures, the words shall govern.

Addenda:

The Bidder hereby acknowledges receipt and inclusion in the Bid Proposal the following addendum (number and date):

Addendum No. _____Dated: _____Addendum No. _____Dated: _____

Addendum No. _____Dated: _____Addendum No. _____Dated: _____

Addendum No. _____Dated: _____Addendum No. _____Dated: _____

Unit Price: (subcontractors shall insert either "not applicable" or the add/deduct amount in every space provided)

[insert unit price description here, include desired units, e.g. $/sf] _____ $ _____ Add/Deduct

[insert unit price description here, include desired units, e.g. $/sf] _____ $ _____ Add/Deduct

[insert unit price description here, include desired units, e.g. $/sf] _____ $ _____ Add/Deduct

Alternates: (subcontractors shall insert either "no change" or the add/deduct amount in every space provided)

[insert alternate price description here] _____ $ _____ Add/Deduct

[insert alternate price description here] _____ $ _____ Add/Deduct

[insert alternate price description here] _____ $ _____ Add/Deduct

Changes in the Work:

Changes in the Work shall be administered per the executed agreement between the Bidder and the Contractor. The fee limits stated in the Bidding Documents shall be used for pricing of additions and deletions to the Work.

Performance and Payment Bond Cost: (not to be included in Base Bid amount)
$_____[If required to provide performance and payment bonds, Contractor will pay only Bidder's actual costs without markup. Therefore, provide the Performance and Payment Bond Cost based upon actual cost from the Bidder's surety with no markup. Bonds shall be written on the

forms included in the Bidding Documents.]

Time of Commencement, Completion and Damages:

1. The Bidder agrees that if awarded a contract, Bidder will have Bidder's Work ready for either the follow-on contractor's work or the completion of Contractor's Work in accordance with the Project schedule. The Bidder agrees to commence work under the contract awarded to Bidder **within seven (7) calendar days** after the date of a "Notice to Proceed", unless otherwise stipulated in that notice.
2. Time is expressly declared to be of the essence in completion of the Work covered by this Bid, and the Bidder shall be liable for actual damages for delay in completion of Work.

General Agreements:

1. The Bidder agrees that Bidder has had an opportunity to examine the site of the Work and has examined the Bidding Documents, and that Bidder has carefully prepared Bidder's Bid upon the basis thereof and that Bidder has carefully examined and checked this Bid and the materials, equipment, and labor required thereunder, the cost thereof, and its figures therefore, and hereby states that the amount or amounts set forth in this Bid Proposal Form is, or are, correct and that no mistake or error has occurred in this Bid or in the Bidder's computations upon which this Bid is based, and the Bidder agrees that it will make no claim for reformation, modification, recission, or correction of this Bid after the scheduled closing time for receipt of Bids.
2. The Bidder acknowledges that the Contractor reserves the right to waive informalities and to reject any or all bids.
3. The Bidder agrees that this Bid shall not be withdrawn or altered for a period of **Forty-Five (45)** calendar days after the last date scheduled for the submission of bids.
4. By signing this Bid, Bidder certifies that this Bid has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this Bid with any other Bidder or with any competitor.
5. Bidder acknowledges that this Bid Proposal Form is required to be executed by an authorized officer of Bidder's company. Bidder further acknowledges that it is expressly reasonable for Contractor to rely on representations set forth in this Bid Proposal Form and the apparent authority of the individual executing it on behalf of the Bidder to bind the Bidder to the obligations herein.
6. By sigining below, Bidder agrees to contract under the Subcontract Documents as provided (including project-specific modifications, if any, made at a later time) without clarification or modification.

The undersigned Bidder agrees that, when these requirements have been completed, it will execute an agreement with the Contractor/Construction Manager on the **Subcontract or the Material and Equipment Contract** exhibited in the Project Manual.

DATED THIS _____ DAY OF _____ , 20____.

Signature of Authorized Officer _____

Printed Name of Authorized Officer _____

Attachments: Contractor's Scope of Work description(s).

SECTION 00 52 00
CONTRACT BETWEEN CONTRACTOR AND SUBCONTRACTOR

[Subcontract, as modified]

The Subcontract may be modified from the form included to reflect Project-specific provisions required by the Owner. Otherwise, the Subcontract shall not be changed from the form that is included. The Bidder shall include in its Bid all costs associated with executing the Subcontract unconditionally and as provided in this Section.

BJD

Project No. _____

SUBCONTRACT

This Subcontract, dated _____, _____, is made by and between:

The **Contractor:** J.E. Dunn Construction Company
1001 Locust
Kansas City, Missouri 64106

And **Subcontractor**:

For the **Project**: Mid-Continent Public Library

The **Owner** of the Project is: Consolidated Library District #3
AKA Mid-Continent Public Library
15616 East Highway 24
Independence, Missouri 64050

The **Architect** for the Project is:

Contractor and Subcontractor may be collectively referred to in this Subcontract as the "Parties." The Parties agree as follows:

Article I. SAFETY

Section 1.01 The Subcontractor shall take reasonable safety precautions with respect to performance of the Work, shall comply with safety measures initiated by the Contractor, including Contractor's Safety and Health Program that can be found at http://sms.jedunn.com/safety_program (which is incorporated in this Subcontract by this reference), and with applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities for the safety of persons and property in accordance with the requirements of the Prime Contract. If required, Subcontractor shall prepare a written site-specific safety plan for the Project prior to commencing the Work. Subcontractor shall report to Contractor within the time required by Contractor's Safety and Health Program any injury to an employee or agent of Subcontractor which occurred at the site.

Section 1.02 Subcontractor agrees to comply with all laws, regulations and codes concerning safety as shall be applicable to the Work and to the safety standards established during the progress of the Work by Contractor. When so ordered, Subcontractor agrees to stop any part of the Work which Contractor deems unsafe until corrective measures satisfactory to Contractor have been taken, and further agrees to make no claim for damages growing out of such stoppages. Should Subcontractor neglect to adopt such corrective measures, Contractor may perform them and deduct the cost from payments due or to become due Subcontractor. Failure on the part of Contractor to stop unsafe practices shall, in no way, relieve Subcontractor of its responsibilities.

Section 1.03 To assist Contractor in tracking and recording safety performance on the Project, Subcontractor and its subcontractors of any tier shall provide Contractor with complete, accurate and reliable documentation of: (a) the number of hours their respective employees actually worked in connection with the Project; and (b) all OSHA recordable incidents in connection with the Project, including but not limited to a properly prepared, Project-specific OSHA Form 300. Contractor's receipt of the documentation described in this Section shall be a condition precedent to Subcontractor's right to receive final payment in connection with the Project.

Article II. SUBCONTRACT DOCUMENTS

Section 2.01 The Subcontract Documents are enumerated below:

- **(a)** This Subcontract and all Exhibits attached to this Subcontract (collectively, the "Subcontract"):
  - **(i)** Exhibit A – Subcontract Documents
  - **(ii)** Exhibit B – Scope of Work and Subcontract Sum
  - **(iii)** Exhibit C – Subcontractor Certification
  - **(iv)** Exhibit D – Owner's Tax Exemption, if any
  - **(v)** Exhibit E – AIA A201-2007 General Conditions of the Contract for Construction
  - **(vi)** Exhibit F – Owner Requirements
- **(b)** Modifications to the Subcontract Documents executed by Contractor and Subcontractor after this Subcontract is signed; and
- **(c)** The Prime Contract, consisting of the contract between the Owner and the Contractor and the other Contract Documents enumerated in or attached to the Prime Contract, as modified from time to time.

Section 2.02 The Subcontract Documents are incorporated by reference into this Subcontract as if set forth verbatim at this point.

Section 2.03 The Subcontract may be amended only be written Modification signed by both Parties.

Section 2.04 Unless defined differently in the Prime Contract (in which case, the Prime Contract definition controls), a Modification is a written amendment to this Subcontract signed by both Parties,

including a Change Order. A Field Work Directive signed by Contractor shall also constitute a Modification.

Article III. MUTUAL OBLIGATIONS

Section 3.01 Contractor and Subcontractor are mutually bound by the terms of this Subcontract. The Prime Contract governs this Subcontract to the extent the terms of the Prime Contract apply to Subcontractor or the Work of this Subcontract, and to that extent Contractor assumes toward Subcontractor all of the obligations and responsibilities that Owner, under the Prime Contract, assumes toward the Contractor under the Prime Contract, and Subcontractor assumes toward Contractor all obligations and responsibilities that Contractor assumes toward Owner under the Prime Contract. Contractor shall have the benefit of all rights, remedies and redress against Subcontractor that Owner has against Contractor under the Prime Contract, and the Subcontractor shall have the benefit of all rights, remedies and redress against Contractor that Contractor has against Owner under the Prime Contract. This Subcontract shall prevail in the event of any conflict between a provision of this Subcontract and a provision of the Prime Contract.

Section 3.02 By signing this Subcontract, Subcontractor agrees and acknowledges that it has either obtained or was provided with ample opportunity to obtain a copy of the Prime Contract (excluding proprietary and confidential information) for review prior to executing this Subcontract. Subcontractor acknowledges that although certain provisions of the Prime Contract applicable to Subcontractor may be repeated in this Subcontract, such repetition is for Subcontractor's convenience and Subcontractor is bound by all terms of the Prime Contract applicable to Subcontractor and the Work of this Subcontract whether or not such terms are repeated in this Subcontract. Subcontractor's failure, if any, to obtain a copy of the Prime Contract shall not relieve Subcontractor of its obligations under the Prime Contract.

Article IV. SUBCONTRACT SUM AND SCOPE OF WORK

Section 4.01 Subcontractor shall execute the Work described in Exhibit B (the "Work") in strict accordance with all Subcontract Documents. The Work includes all labor, materials, equipment, services and other items required by the Subcontract Documents or reasonably inferable from the Subcontract Documents in order to complete the Work, except to the extent specifically indicated in the Subcontract Documents to be the responsibility of others.

Section 4.02 In consideration of proper and timely performance of the Work, Contractor shall pay the Subcontractor the Subcontract Sum set forth in Exhibit B, which sum includes all applicable taxes. The Subcontract Sum may be adjusted in accordance with the Subcontract Documents. Any allowances and alternates included in the Subcontract Sum shall be identified in Exhibit B, along with any unit pricing agreed upon by the Parties.

Article V. PAYMENT

Section 5.01 As a condition precedent to payment, Subcontractor shall provide Contractor with a schedule of values satisfactory to Contractor not more than fifteen (15) days from the date Subcontractor executes this Subcontract. The schedule of values shall allocate the entire Subcontract Sum among the various portions of the Work, and be prepared in such form and supported by such data as to substantiate its accuracy as Contractor may require. Each application for payment shall include this schedule of values, which schedule shall indicate the percentage of completion of each portion of the Work as of the end of the period covered by the application for payment for payment. If the Subcontractor is obligated to provide design services in connection with the Work, the schedule of values shall show Subcontractor's design professional's fee and expenses as a separate line item.

Section 5.02 Based upon applications for payment submitted to Contractor by Subcontractor, the Contractor shall make progress payments to Subcontractor on account of the Subcontract Sum as provided

below and elsewhere in the Subcontract Documents. The period covered by the application for payment shall be one calendar month. Contractor shall pay Subcontractor each progress payment no later than five (5) business days after Contractor receives payment from Owner.

Section 5.03 Subcontractor shall submit an application for payment to Contractor each month, at least five (5) business days before the date the Prime Contract requires that Contractor submit Contractor's application for payment to the Owner. A timely submitted application for payment shall be included in the next application for payment which Contractor is entitled to submit to the Owner. If Subcontractor's application for payment is received after the deadline described above, the Work covered by Subcontractor's application for payment shall be included by Contractor in the following month's application for payment to Owner.

Section 5.04 As a condition precedent to payment, Subcontractor shall provide waivers and affidavits with each application for payment for itself and its subcontractors and suppliers in the form included in the Subcontract Documents. Subcontractor shall not be entitled to any payments until this Subcontract is executed by Contractor and Subcontractor, and all documents and information required by the Subcontract Documents, including properly prepared applications for payment, have been submitted.

Section 5.05 The amount of each progress payment shall be calculated as follows:

- **(a)** Take that portion of the Subcontract Sum properly allocable to completed Work;
- **(b)** Add, to the extent permitted by the Prime Contract, that portion of the Subcontract Sum properly allocable to materials and equipment delivered and suitably stored at the site by the Subcontractor for subsequent incorporation in the Subcontractor's Work or, if approved by the Contractor, suitably stored off the site at a location agreed upon in writing, less the same percentage retainage required by the Prime Contract to be applied to such materials and equipment in the Contractor's application for payment;
- **(c)** Subtract retainage in a percentage equal to the percentage of retainage withheld by Owner from Contractor under the Prime Contract on account of the Work of this Subcontract;
- **(d)** Subtract the aggregate of previous payments made by the Contractor; and
- **(e)** Subtract amounts, if any, that are related to any Work for which the Architect, the Owner, and/or Contractor has withheld or nullified, in whole or in part, a certificate of payment for a cause that is the fault of Subcontractor.

Section 5.06 Retainage shall be withheld until five (5) business days after Contractor has received payment of retainage from the Owner.

Section 5.07 Contractor is authorized to deduct from and offset against any and all payments or amounts otherwise due Subcontractor under this Subcontract or any other agreement between Contractor and Subcontractor an amount equal to any and all sums or obligations owed by Subcontractor to Contractor, including but not limited to any costs incurred by Contractor to complete any work that Subcontractor was obligated to perform, and any and all claims, liquidated or unliquidated, by Contractor against Subcontractor, arising under this Subcontract or under any other agreement between the Parties.

Section 5.08 Final payment, constituting the entire unpaid balance of the Subcontract Sum, shall be made by Contractor to Subcontractor when: (1) the Subcontractor's Work is fully performed in accordance with the requirements of the Subcontract Documents; (2) Contractor has received payment from the Owner for the Subcontractor's Work; and (3) Subcontractor has fully complied with any other requirements of the Subcontract Documents.

Section 5.09 Before issuance of the final payment, Subcontractor, if required, shall submit evidence satisfactory to Contractor that all payrolls, bills for materials and equipment, and all known indebtedness connected with the Subcontractor's Work have been satisfied. As a condition of final payment, Subcontractor shall furnish waivers and affidavits with the final pay application for itself and its subcontractors and suppliers in the form included in the Subcontract Documents. Acceptance of final payment by Subcontractor shall constitute a waiver of claims by Subcontractor.

Article VI. SUBCONTRACT TIME

Section 6.01 The Subcontract Time is the period of time, including authorized adjustments, allotted in the schedule of construction developed by the Contractor (the "Project Schedule") for completion of the Work. The Work of this Subcontract shall be commenced and completed pursuant to the Project Schedule as may be amended from time to time.

Section 6.02 Time is of the essence of this Subcontract.

Section 6.03 Subcontractor recognizes that revisions in the planned schedule are inherent in the nature of construction. This may result in revisions to Contractor's schedule of the Work during the progress of construction. Subcontractor agrees that Contractor cannot guarantee Subcontractor will be able to start Work on any particular date or continue without interruption once started. Contractor will only be responsible for changes to the Subcontract Time within Contractor's control which cause Subcontractor unreasonable delay in the performance of critical-path Work, provided Subcontractor gives immediate written notice of the delay to Contractor. No extension of time granted the Contractor by the Owner shall accrue to the benefit of the Subcontractor unless the critical path of the Subcontractor's Work has actually been delayed, an extension of time is allowable under the Subcontract, and such extension of time directly relates to the Subcontractor's Work as solely determined by Contractor and is specifically agreed to in writing.

Section 6.04 Subcontractor shall cooperate with Contractor in the preparation of the Project Schedule. Subcontractor shall have its superintendent(s) and/or foreman attend scheduled coordination and planning meetings held by Contractor, at which time Subcontractor shall submit, for coordination and approval, its proposed daily work schedule for the next period as required by Contractor. Failure of the Subcontractor to attend regularly scheduled meetings will not relieve Subcontractor of the responsibility to perform all Work and comply with all instructions given during the meeting. Interferences, delays, hindrances, and costs, including, but not limited to any loss of productivity, due to Subcontractor's failure to attend or participate in coordination and planning meetings or due to lack of coordination shall be the sole responsibility of Subcontractor, at no cost or impact to the Contractor or Owner. Further, Subcontractor shall notify Contractor in writing, within seven (7) days of the date Contractor distributes any revised Project Schedule (not including pull-planning milestone updates, look-ahead schedules, fragnets, daily work schedules, or similar sections of the overall Project Schedule), of any issues, complications or difficulties resulting from such schedule update. In the absence of such written notice, Subcontractor shall be conclusively presumed to have agreed to and accepted any such updated schedule.

Section 6.05 If Subcontractor delays the progress of the Work, Subcontractor shall, at its own cost and expense, work such overtime and provide such additional labor as may be necessary to avoid delay in the completion of the Work.

Article VII. CHANGES

Section 7.01 Contractor reserves the right, from time to time, whether the Work or any part of the Work shall or shall not have been completed, to make changes, additions and/or omissions in the Work as it may deem necessary, upon written order to Subcontractor. No changes shall be made in the Work except upon the written order of Contractor. Subcontractor shall not be entitled to receive, and shall not claim,

compensation for any extra Work unless Contractor issues a written order for such Work to Subcontractor, as no claims shall be recognized based upon any verbal orders.

Section 7.02 If Subcontractor intends to make a claim for an increase in the Subcontract Sum or the Subcontract Time in connection with a written order from Contractor for a change, addition or omission in the Work, Subcontractor shall give the Contractor written notice of such claim within five (5) business days of the date Subcontractor receives the order. A claim which will affect or become part of a claim which Contractor is required to make under the Prime Contract within a specified time period or in a specified manner shall be made in the manner required by the Prime Contract at least two (2) business days prior to the date Contractor is required by the Prime Contract to submit such claim to Owner (but no later than five (5) business days after the occurrence of the event causing the claim). Failure of Subcontractor to make a timely claim shall bind Subcontractor to the same consequences as those to which Contractor is bound.

Section 7.03 An agreement on any Change Order between Contractor and Subcontractor shall constitute a final settlement of all matters relating to the change in the Work which is the subject of the Change Order, including any and all adjustments to the Subcontract Time and Subcontract Sum.

Section 7.04 In the absence of total agreement on the terms of a Change Order, Contractor may direct changes in the Work by issuing a Field Work Directive. A Field Work Directive is a written order signed by the Contractor directing a change in the Work prior to agreement on the adjustment, if any, in the Subcontract Sum. Upon receipt of a Field Work Directive signed by Contractor, Subcontractor shall promptly proceed with the change in the Work while pricing the change in the Work.

Article VIII. EXECUTION AND PROGRESS OF THE WORK

Section 8.01 Subcontractor shall enter into written agreements with any lower-tier subcontractor(s) performing portions of the Work by which the Subcontractor and the lower-tier subcontractor(s) are mutually bound by this Subcontract, to the extent of the Work to be performed by the lower-tier subcontractor(s), assuming toward each other all obligations and responsibilities that the Contractor and Subcontractor assume toward each other and having the benefit of all rights, remedies and redress each against the other that the Contractor and Subcontractor have by virtue of the provisions of this Subcontract.

Section 8.02 Subcontractor and its lower-tier subcontractors shall comply with all General Requirements set forth in the Project Manual.

Section 8.03 To promote the safety, efficiency and quality of the Work of this Subcontract, Subcontractor shall assign a full-time on-site supervisor to the Project who is able to read, write and speak English fluently in order to communicate with Contractor's personnel and the supervisory personnel of other trades. Subcontractor shall not assign to or retain at the Project any supervisor or worker deemed objectionable by Contractor. Subcontractor shall remove and replace any supervisor or worker deemed objectionable by Contractor promptly upon Contractor's request.

Section 8.04 Subcontractor shall obtain and pay for all necessary permits and licenses pertaining to the Work and shall comply with all Federal, State, municipal and local laws, ordinances, codes, rules, regulations, standards, orders, notices and requirements, including, but not limited to, those relating to safety, discrimination in employment, immigration, fair employment practices, equal employment opportunity, or environmental regulation whether or not provided for by the Subcontract Documents and without additional charge or expense to Contractor. Subcontractor shall also be responsible for and correct, at its own cost and expense, any violations of the above-described permits, licenses, or legal requirements resulting from or in connection with the performance of the Work. Subcontractor shall at any time upon demand furnish such proof as Contractor may require showing such compliance and the correction of such violations. Subcontractor agrees to save harmless and indemnify Contractor from and against any and all

loss, injury, claims, actions, proceedings, liability, damages, fines, penalties, costs and expenses, including attorney's fees and other legal fees and disbursements, caused or occasioned directly or indirectly by Subcontractor's failure to comply with any of said laws, ordinances, rules, regulations, standards, orders, notices or requirements or to correct such violations resulting from or in connection with the performance of the Work. Subcontractor shall provide a copy of all permits for the Work to Contractor.

Section 8.05 Subcontractor shall take necessary precautions to protect the work of Contractor and other subcontractors from damage caused by operations under this Subcontract.

Section 8.06 Subcontractor shall have a continuing duty to provide Contractor with a current list of its subcontractors and suppliers of any tier.

Section 8.07 Subcontractor shall verify all dimensions given in the Subcontract Documents for accuracy and shall take such measurements as will insure the proper matching and fitting of the Work with contiguous work.

Section 8.08 Subcontractor shall prepare and submit to Contractor such shop drawings and submittals as may be necessary to completely describe the details and construction of the Work. Approval of shop drawings and submittals by Contractor will not relieve Subcontractor of its obligation to perform the Work in strict accordance with the Subcontract Documents or for the proper matching and fitting of the Work with contiguous work. The time requirements for submission of shop drawing and other submittals shall be coordinated by Subcontractor with Contractor so that sufficient time is allowed for review and comment without delay to the commencement or progress of the Work. All differences and discrepancies between Subcontractor's shop drawing and the Subcontract Documents shall be clearly highlighted, noted in writing and called to Contractor's attention.

Section 8.09 Should the proper and accurate performance of the Work of this Subcontract depend upon the proper and accurate performance of other work not included in this Subcontract, Subcontractor shall, prior to proceeding with the Work, notify Contractor in writing of any known defects in such other work, including substrate and contiguous work, and shall allow Contractor a reasonable time to remedy such defects. Should Subcontractor proceed with its Work and fail to notify Contractor of any known defects in other work as required under the Subcontract, Subcontractor shall be considered to have accepted such other work as being fit and proper.

Section 8.10 Subcontractor's Work shall include all cutting and patching of substrate or contiguous work necessary for the proper performance of the Work.

Section 8.11 Subcontractor shall provide sufficient, safe, and proper facilities at all times for the inspection of the Work by Contractor, in the field, at shops, or at any other place where materials are in the course of preparation, manufacture, treatment, or storage. Subcontractor shall take down all portions of the Work and remove from the premises all material, whether worked or unworked, which Contractor shall condemn as unsound or improper, or as in any way failing to conform to the Subcontract Documents. Subcontractor shall, at its own cost and expense, make good all work damaged or destroyed by, through or under Subcontractor and replace all materials removed with proper materials.

Section 8.12 Subcontractor shall, on a daily basis or as otherwise directed by Contractor, clean and remove from Subcontractor's Work, contiguous work and adjoining property any dirt, droppings, spillage, debris, garbage and/or overspray, which was caused by the execution of the Work. Subcontractor shall clean up and remove from the premises all debris caused by the execution of the Work.

Section 8.13 Subcontractor acknowledges that Contractor may be a party to certain collective bargaining agreements with various union crafts, which agreements may affect the work of subcontractors, including Subcontractor, while working on this Project. Subcontractor agrees that, to the extent any such agreement is applicable to Work performed by Subcontractor, Subcontractor shall take all steps necessary to comply with the Subcontractor articles or other applicable provisions of Contractor's collective bargaining agreements. If any portion of Subcontractor's Work is further subcontracted, the Subcontractor shall require its lower tier subcontractors to be bound by and observe all terms and provisions of such collective bargaining agreements to the same extent required of Subcontractor**.**

Section 8.14 Subcontractor agrees that in the event of any strike, picket, sympathy strike, work stoppage or other form of labor dispute or picket in connection with the work of Contractor, Subcontractor, the Owner, or any other subcontractor or person, Subcontractor will, contingent upon Contractor providing a picket free entrance, continue to perform the Work required in this Subcontract without interruption or delay. Contractor shall have no obligation to provide a picket free entrance should such labor activity be directed at Subcontractor. In the event Subcontractor fails to continue performance of the Work without interruption or delay, because of such picket or other form of labor dispute, Contractor may terminate the Subcontract after giving forty-eight (48) hours written notice, or Contractor may invoke any of the rights set forth elsewhere in this Subcontract.

Section 8.15 Project work hours shall be 7:30 AM to 4:00 PM unless modified by Contractor.

Article IX. REMEDIES

Section 9.01 Contractor's Remedies

(a) Damages for delay, including those assessed against Contractor pursuant to the Prime Contract, shall be assessed against Subcontractor only to the extent caused by the Subcontractor or any person or entity for whose acts the Subcontractor may be liable.

(b) Should Subcontractor at any time: (1) refuse or neglect to supply sufficient and properly skilled workers; (2) refuse or neglect to supply materials of the proper quality; (3) fail in any respect to prosecute the Work with promptness and diligence; (4) make a general assignment for the benefit of its creditors, have a receiver appointed to take over its affairs, or, in the opinion of Contractor, become financially or legally incapable of completing the work; or (5) fail in the performance of any of the covenants contained in this Subcontract; and fail to correct such default or neglect with diligence and promptness within three (3) days after written notice from Contractor, then Subcontractor shall be in default of this Subcontract and Contractor may, without additional written notice or prejudice to any other remedy, either:

(i) provide such labor, materials, or services or other Work as is required by this Subcontract; or

(ii) terminate the employment of Subcontractor for the Work, enter upon the premises, take possession of all materials, tools, and appliances on the premises for the purpose of completing the Work, employ any other person or persons to finish the Work, and provide the materials required under this Subcontract.

Contractor shall be entitled to recover all of its expense under this Section including all labor, materials, services (whether by Contractor or others) and any other cost (including attorneys' fees) or damages incurred as a result of Subcontractor's default. Contractor may withhold payment and deduct the expense, costs and damages resulting from Subcontractor's default from any money then due or that may become due to the Subcontractor under this Subcontract. If such expense exceeds the unpaid balance of the amount to be paid under this Subcontract, the Subcontractor shall pay the difference to Contractor on demand. If this Subcontract is terminated, the Subcontractor shall not be entitled to receive any further payment under this Subcontract until the Work is complete and a

final resolution of all claims, damages, losses and expenses arising out of or resulting from performance of the Work has been achieved, and Owner has paid Contractor in full for all Work performed by Subcontractor under this Subcontract.

(c) If at any time there shall be evidence of any invoice, bill, lien or claim arising from Subcontractor's operations under this Subcontract or any other agreement between the Parties ("Claim") for which Contractor, Owner, a surety, or any property, may be or become liable or subject to, then Contractor shall have the right to retain out of any payment then due or that may become due to Subcontractor, an amount sufficient to discharge such Claim and reimburse Contractor, Owner, and surety for all costs and expenses (including attorneys' fees) in connection with such Claim. If Subcontractor has failed to resolve a Claim or provide a bond to protect Owner, Contractor and any surety against such Claim within ten (10) days after written notice, Contractor, Owner or a surety shall have the right to make payment on such Claim out of funds due or to become due the Subcontractor. The Subcontractor shall defend, indemnify and hold harmless the Contractor, the Owner and surety for all claims or amounts any of them may be liable, become liable or have in good faith paid in discharging any Claim, including any associated costs and expenses (including attorneys' fees). The rights and obligations hereunder shall not apply in the event that the Claim arises from Contractor's failure to make payment to Subcontractor in accordance with the Subcontract.

(d) If Subcontractor fails to clean up as provided in the Subcontract Documents, Contractor shall give Subcontractor written notice to comply within twenty-four (24) hours. If Subcontractor fails to comply within twenty-four (24) hours, Contractor is authorized to perform the cleanup and to assess Subcontractor a reasonable charge. The Subcontract Sum will be reduced for Contractor's cleanup costs.

Section 9.02 Subcontractor's Remedies

If Contractor does not pay Subcontractor through no fault of Subcontractor, within seven (7) days from the time payment should be made as provided in this Subcontract, Subcontractor may, without prejudice to any other available remedies, upon seven (7) additional days' written notice to Contractor, stop the Work of this Subcontract until payment of the amount owing has been received. The Subcontract Sum shall, by appropriate written modification, be increased by the amount of Subcontractor's reasonable costs of demobilization, delay and remobilization.

Section 9.03 Mutual Waiver of Consequential Damages

Contractor and Subcontractor waive claims against each other for their consequential damages arising out of or relating to this Subcontract, including without limitation, any consequential damages due to either Party's termination. This waiver shall not apply to any damages assessed against Contractor in accordance with the Prime Contract, or damages related to Subcontractor's indemnification obligations.

Article X. INDEMNITY

Section 10.01 To the fullest extent permitted by law, Subcontractor shall defend, indemnify and hold harmless the Owner, Contractor, other parties that Contractor is required to indemnify under the Prime Contract and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from performance of Subcontractor's Work under this Subcontract, but only to the extent caused by the negligent acts or omissions of the Subcontractor, Subcontractor's Sub-subcontractors, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. However, Subcontractor shall not be required to indemnify any indemnified party to the extent any such claim, damage, loss or expense was caused by the negligence or other fault of such indemnified party. Such obligation shall not be construed to negate, abridge, or otherwise reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section.

Section 10.02 In claims against any person or entity indemnified under this Article by an employee of the Subcontractor, the Subcontractor's Sub-subcontractors, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the obligations under preceding Section shall not be limited by a limitation on the amount or type of damages, compensation or benefits payable by or for the Subcontractor or is lower-tier subcontractors under workers' compensation acts, disability benefit acts or other employee benefit acts.

Article XI. WARRANTY

Subcontractor warrants to Contractor and all other parties that Contractor warrants its work to as set forth in the Prime Contract that materials and equipment furnished under this Subcontract will be of good quality and new unless the Subcontract Documents require or permit otherwise. Subcontractor further warrants that the Work will conform to the requirements of the Subcontract Documents and will be free from defects, except for those inherent in the quality of the Work the Subcontract Documents require or permit. Work, materials, or equipment not conforming to these requirements, including substitutions not properly approved and authorized, may be considered defective. Subcontractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Subcontractor, improper or insufficient maintenance, improper operation, or normal wear and tear under normal usage. If required by the Architect, Owner or Contractor, Subcontractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment. This warranty shall be in addition to and not in limitation of any other warranty or remedy required by law or by the Subcontract Documents.

Article XII. INSURANCE

Section 12.01 Contractor has elected to provide General Liability insurance through a Controlled Insurance Program ("CIP") for Contractor and enrolled subcontractors. The Subcontract Sum includes the cost of providing and maintaining the specific insurance coverage required by the Controlled Insurance Program Requirements and Forms manual ("CIP Manual"), as set forth in the Project Manual. The Subcontract Sum specifically excludes costs of onsite General Liability coverage for enrolled Subcontractors.

Section 12.02 Subcontractor shall comply, and shall require its lower tier subcontractors to comply, with all requirements in the CIP Manual for enrolled or non-enrolled subcontractors, as applicable. The following parties are required to be named as additional insureds on liability policies required to be provided by Subcontractor and its lower-tier subcontractors:

Owner – Consolidated Library District #3
Contractor – J. E. Dunn Construction Company
Other parties required by the Prime Contract

Section 12.03 Subcontractor shall ensure that its lower tier subcontractors include the cost of providing and maintaining the specific insurance coverage required by the CIP Manual, but exclude costs of onsite General Liability coverage for enrolled Subcontractors.

Section 12.04 Subcontractor shall provide insurance for its tools and equipment at its own cost and waives all rights against Owner, Contractor, Architect and other subcontractors of any tier for damages or losses to such tools and equipment, however caused. Subcontractor's insurance policies shall provide for such waiver by endorsement or otherwise.

Section 12.05 Contractor and Subcontractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Owner, the Architect, the Architect's consultants, separate contractors, and any of their subcontractors, sub-subcontractors, agents and employees for damages caused by fire or other causes of loss to the extent

covered by property insurance provided under the Prime Contract or other property insurance applicable to the Work, to the extent such subrogation rights are waived under the terms of the Prime Contract, except such rights as they may have to proceeds of such insurance. The Subcontractor shall require of the Subcontractor's Sub-subcontractors, agents and employees, by appropriate agreements, written where legally required for validity, similar waivers in favor of the parties enumerated in this Subcontract. In the event of an insured loss arising out of Subcontractor's Work, Subcontractor shall be responsible for payment of the deductible to the extent Subcontractor caused or could have prevented the loss. The deductibles for losses covered by Builder's Risk insurance provided for the Project, include, but are not limited to, the following:

(a) General All Risk covered perils: $10,000 per occurrence
(b) Water related damages (other than Flood): $50,000 per occurrence

Other coverage information, including the deductible for damages arising out of Named Windstorms, is available from Contractor upon request.

Article XIII. BONDS

Contractor shall have the right to require Subcontractor to furnish bonds providing for the faithful performance of the Subcontract and the payment of all obligations arising under the Subcontract on Contractor's standard form (or such form as required by law) the cost of which will not be included in the Subcontract Sum. Subcontractor shall invoice Contractor the cost of such bonds separately with no markup which must be supported by an invoice from the Subcontractor's surety or surety broker. Contractor will reimburse Subcontractor for the cost of such bonds separately. Bonds shall be issued by a surety company that is rated "A-" or better by A.M. Best Company, has a per bond underwriting limit set forth in the most current United States Treasury Department Circular 570 List that is greater than or equal to the face value of the bond, and approved by the Contractor.

Article XIV. MEDIATION AND BINDING DISPUTE RESOLUTION

Section 14.01 Mediation

(a) Any claim arising out of or related to this Subcontract, except those waived in this Subcontract, shall be subject to mediation as a condition precedent to binding dispute resolution.
(b) The Parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having proper jurisdiction.

Section 14.02 Binding Dispute Resolution

(a) Any claim not resolved by mediation shall be resolved in the manner described in this Section.
(b) Subcontractor shall be bound by all decisions, interpretations, findings of fact or law, whether express, implied, interim, or final (each a "Decision," and collectively "Decisions"), arising out of the claim and dispute resolution processes set forth in the Prime Contract to the extent: (1) such Decisions relate to or affect the Work or services subcontracted to Subcontractor; (2) any claim by Owner against Contractor involves the performance of Subcontractor; or (3) any claim of Subcontractor gives rise to a claim by Contractor against Owner. The initiation of claim or dispute resolution under the Prime Contract shall stay dispute resolution under this Subcontract on any claim or issue brought by Subcontractor related to the dispute under the Prime Contract.
(c) To the extent Subcontractor will be bound as set forth above, Contractor agrees to Subcontractor's participation (and joinder if requested) in such claim or dispute resolution process, and Subcontractor may appeal (in the event Subcontractor has been joined as a party), or request Contractor to appeal, any Decision pursuant to the claim or dispute resolution procedure of the Prime Contract. Subcontractor and Contractor shall individually bear the costs associated with their

own claims in such appeal. A Party will follow the other Party's directions regarding the other Party's claims, unless such directions adversely affect the Party's own claims. In that event the Parties will agree on how to proceed. Each Party will give the other Party reasonable assistance.

(d) Subcontractor consents to joinder in any dispute or claim resolution process under the Prime Contract, including arbitration. This agreement to arbitrate and agreement to arbitrate with another person or persons, if applicable, shall be specifically enforceable under applicable law in any court having jurisdiction.

(e) Any claim or dispute not involving the Prime Contract or waived in this Subcontract shall be subject to arbitration, which arbitration shall be conducted in accordance with the then-current Construction Industry Arbitration Rules promulgated by the American Arbitration Association. Prior to arbitration, the Parties shall endeavor to resolve claims and disputes by mediation. In the event of arbitration, the award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction.

(f) Unless otherwise agreed in writing by the Contractor, the Subcontractor shall continue to fully perform its Work and maintain its progress during any dispute or any claim under this Subcontract.

(g) The provisions of this Article supersede provisions of the Prime Contract or other Subcontract Document terms, if any, to the contrary.

(h) To the fullest extent permitted by law and without limiting any other provision in this Subcontract, if either Party asserts a claim against the other Party in a lawsuit or arbitration proceeding, the prevailing Party shall be entitled to recover its costs, including reasonable attorneys' fees, incurred in connection with prosecuting or defending against that claim. Subcontractor shall pay any reasonable attorney's fees and costs incurred by or assessed against Contractor in connection with any claim that Subcontractor requests that Contractor assert on Subcontractor's behalf under the claim or dispute resolution procedure of the Prime Contract.

Section 14.03 This Article shall survive completion or termination of the Subcontract.

Article XV. TERMINATION, SUSPENSION AND ASSIGNMENT

Section 15.01 Termination

(a) Contractor's right to terminate this Subcontract for cause are set forth in a preceding Section.

(b) Contractor may terminate this Subcontract for Contractor's convenience and without cause with ten (10) days written notice to Subcontractor. If the Owner terminates the Prime Contract for the Owner's convenience, Contractor shall promptly deliver written notice to the Subcontractor that this Subcontract is terminated for convenience.

(c) Upon receipt of written notice for termination for convenience, except to the extent Contractor directed Subcontractor in the notice of termination to complete certain Work prior to the effective date of the termination, Subcontractor shall: (1) cease operations as directed by Contractor in the notice; (2) take all actions necessary or directed by Contractor to protect and preserve the Work; and (3) terminate all existing lower tier subcontracts and purchase orders.

(d) In the event of termination for convenience, Subcontractor may request payment for Work executed, and costs incurred by reason of such termination; provided, however, Subcontractor shall only be reimbursed for costs incurred by reason of termination to the extent Owner first reimburses Contractor for such costs.

(e) In the event Contractor terminates this Subcontract for cause, and it is determined for any reason that Subcontractor was not in default, or that the default was excusable, then the rights and the obligations of the Parties shall be the same as if Contractor had terminated the Subcontract for convenience.

Section 15.02 Suspension

(a) Contractor may, without cause, order the Subcontractor in writing to suspend, delay or interrupt the Work of this Subcontract in whole or in part for such period of time as the Contractor may determine. In the event of suspension ordered by the Contractor, provided Subcontractor is not otherwise in default hereunder, the Subcontractor shall be entitled to an equitable adjustment of the Subcontract Time and Subcontract Sum; provided, however, no adjustment shall be made to the extent that: (1) performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Subcontractor is responsible; or (2) an equitable adjustment is made or denied under another provision of this Subcontract.

(b) In the event Owner suspends the Work of the Prime Contract, or the portion of the Work of the Prime Contract affecting this Subcontract, Subcontractor shall be entitled to an equitable adjustment of the Subcontract Time and Subcontract Sum to the extent the Contractor receives such relief under the Prime Contract.

Section 15.03 Assignment

(a) Effective upon the occurrence of the conditions set forth in the Prime Contract, this Subcontract is assigned to the Owner. Each of Subcontractor's lower-tier subcontracts and purchase orders shall provide that such lower-tier subcontracts and purchase orders are similarly assigned to the Owner.

(b) Subcontractor shall neither assign the Work of this Subcontract nor subcontract the whole or a portion of this Subcontract without Contractor's written consent which consent may be withheld in Contractor's sole discretion.

Section 15.04 Collateral Assignment

The Subcontractor shall not assign or factor any of the funds to be received under or through this Subcontract unless such assignment has the written approval of the Contractor. In order to be so approved, any such assignment shall include the following language:

> It is agreed the funds to be paid to the Assignee under this Assignment are subject to satisfactory performance of the Subcontract under which this Assignment is made (this "Subcontract") by the Assignor (the "Subcontractor") and subject to payment of all invoices, bills, claims, or liens for services rendered or materials supplied for the performance of any portion of the Work called for in this Subcontract with Contractor or any other subcontract agreement between Contractor and Subcontractor. Contractor reserves the right to set-off against any funds which may be due Subcontractor by Contractor or funds to be paid the Assignee the amount of any claim or liens arising under or through this or any other subcontract agreement with the Subcontractor.

Article XVI. MISCELLANEOUS PROVISIONS

Section 16.01 Subcontractor agrees to comply with the provisions of any applicable local, state, or federal ordinance, regulation, statute, or other mandate regarding affirmative action and/or minority/women's business enterprise participation.

Section 16.02 The risk of loss for materials and equipment provided under this Subcontract, whether in a deliverable state or otherwise, shall remain with the Subcontractor until delivered to the job site and incorporated into the Work. Any damage to the material and equipment or loss of any kind occasioned in transit shall be borne by the Subcontractor, notwithstanding the manner in which the material or equipment is shipped or who pays the freight or other transportation costs. Unless otherwise provided, all materials shipped to the job site in performance of this Subcontract shall be shipped at Subcontractor expense. In the event of claims by carriers against Contractor for shipping costs, Contractor shall be entitled to pay such claims and deduct the amount of the claims from the Subcontract Sum.

Section 16.03 Contractor is an Equal Employment Opportunity employer. As such, the requirements of 41 CFR 60-1.4(b) are incorporated by this reference, if applicable.

Section 16.04 Subcontractor shall retain all documentation related to this Project for the duration of the statute of repose.

Section 16.05 This Subcontract contains every obligation and understanding between the Parties relating to the subject matter of this Subcontract, merges all prior discussions, negotiations and agreements, if any, between them, and neither Party shall be bound by any representation, warranty, covenant, or other understanding unless it is in writing and duly executed by the Parties.

Section 16.06 It is the intention of the Parties that each provision of this Subcontract shall be enforced according to its terms and that no provision shall be construed in a manner which renders it invalid or unenforceable. However, if any provision of this Subcontract is determined to be invalid or unenforceable, such provision shall be severed from this Subcontract and the remaining provisions shall remain intact and shall constitute the Subcontract between the Parties without regard to the invalidated provision.

Section 16.07 Subcontractor and each of its respective sub-subcontractors and material suppliers shall comply with the provisions set forth in Exhibit F and in Article 13.8 of the AIA A201-2007 General Conditions of the Contract for Construction, as modified, of the Prime Contract.

THIS SUBCONTRACT CONTAINS A BINDING ARBITRATION PROVISION THAT MAY BE ENFORCED BY THE PARTIES.

IN WITNESS WHEREOF the Parties have caused this Subcontract to be effective as of the date set forth in the first page of this Agreement.

CONTRACTOR	**SUBCONTRACTOR**
By:_____	By:_____
Name:_____	Name:_____
Title:_____	Title:_____
License No. _____	License No.:_____
	FEIN:_____ (if no FEIN, enter business owner SSN)

Exhibit B – Scope of Work and Subcontract Sum

MID-CONTINENT PUBLIC LIBRARY
(PROJECT ADDRESS)

J.E. Dunn Construction Company Project No. _____

Exhibit C – Subcontractor Certification

MID-CONTINENT PUBLIC LIBRARY
(PROJECT ADDRESS)

J.E. Dunn Construction Company Project No. _____

Exhibit D – Owner's Tax Exemption, if any

MID-CONTINENT PUBLIC LIBRARY
(PROJECT ADDRESS)

J.E. Dunn Construction Company Project No. _____

EXHIBIT D
OWNER'S TAX EXEMPTION
MISSOURI

In order that the Owner may take advantage of its tax exemption, the Subcontractor/Supplier has been issued a copy of the Tax Exemption Letter issued by the State of Missouri and the Missouri Project Exemption Certificate issued by the Owner of this Project. The Subcontractor/Supplier shall make copies of these documents and provide them to each vendor and subcontractor from whom the Subcontractor/Supplier purchases tangible personal property and materials to be incorporated into or consumed in the construction of the Project. Proper use of such documents shall allow the Subcontractor/Supplier, subcontractors and vendors to make and pay for such purchases directly and without obligation to pay Missouri sales tax on such purchases. Subcontractor/Supplier hereby agrees to indemnify Owner and Contractor for any loss, damage, cost, or penalty assessed against it by the State of Missouri arising from Subcontractor's/Supplier's improper implementation of the tax exemption granted to this Project. NOTE: Invoices must indicate the name of the Exempt Entity and the Project # assigned to secure a valid tax exemption.

EXHIBIT F

OWNER REQUIREMENT'S

1. The Owner has established a goal for participation and utilization of Minority Business Enterprise and/or Women Business Enterprises (MBE/WBE), as certified by the Missouri Office of Equal Opportunity, of ten percent (10%) of the total funds expended by Construction Manager for the performance of the Work exclusive of Construction Manager's Fee and Construction Manager's General Conditions. Construction Manager will utilize reasonable efforts to achieve the utilization goal of Owner on the Project. Construction Manager will request such participation by Construction Manager's subcontractors and suppliers in achieving the Owner's participation and utilization goal.

2. Construction Manager shall comply with the provisions of Missouri Revised Statute 285.530, which provides that no business entity or employer shall knowingly employ, hire for employment or continue to employ an unauthorized alien to perform work within the State of Missouri additionally, all business entities awarded any contract in excess of five thousand dollars ($5,000.00) by a political subdivision of the State or a business entity that receives State administered or subsidized State tax credit, tax abatement, or loan from the State, that such business entity must, as a condition to the award of any such contract, be enrolled in and participate in a federal work authorization program with respect to the employees working in connection with the contracted services to be provided, to the Owner (to the extent allowed by E-Verify). Accordingly, the Construction Manager and its subcontractors and suppliers shall affirm that each such entity is enrolled in such a federal work authorization program and shall provide a sworn affidavit to that effect, which affidavit shall also state that the Construction Manager, subcontractor, or supplier, as the case may be, does not knowingly employ any person who is an unauthorized alien in connection with the services to be provided to the Construction Manager and Owner in the form attached as Exhibit F1. The Subcontractor shall also provide such additional documentation as is requested by the Construction Manager or Owner to confirm the foregoing.

3. Construction Manager and its subcontractor and all of its subcontractors and suppliers providing onsite work for the Project shall comply with RSMO. 292.675 and provide a ten-hour OSHA construction safety program for on-site employees which includes a course in construction safety and health approved by OSHA or a similar program approved by the Missouri Department of Labor and Industrial Relations which is at least as stringent as an approved OSHA program. All employees are required to complete the program within 60 days of beginning work on such project. Construction Manager shall forfeit as a penalty to Owner, $2,500 plus $100 for each employee employed by Construction Manager or its subcontractors for each calendar day or portion thereof that any such employee is employed without the required training. Construction Manager shall require compliance by its subcontractors and suppliers with the provision of this Section 3 and RSMO 292.675.

4. To the extent applicable, Construction Manager and its subcontractor, subcontractors and suppliers shall comply with Section 290.560 with respect to the workers and laborers performing work on the Project.

Exhibit F-1

FEDERAL WORK AUTHORIZATION PROGRAM ("E-VERIFY") ADDENDUM

Pursuant to Missouri Revised Statute 285.530, all business entities awarded any contract in excess of five thousand dollars ($5,000) with an entity subject to the provision of Missouri Revised Statute 285.530 must, as a condition to the award of any such contract, be enrolled and participate in a federal work authorization program with respect to the employees working in connection with the contracted services being provided, or to be provided, to the Owner or Construction Manager (to the extent allowed by E-Verify). In addition, the business entity must affirm the same through sworn affidavit and provision of documentation. In addition, the business entity must sign an affidavit that it does not knowingly employ any person who is an unauthorized alien in connection with the services being provided, or to be provided, to the Owner or the Construction Manager.

Accordingly, your company:

a. agrees to have an authorized person executed the attached "Federal Work Authorization Program Affidavit" attached hereto as Exhibit F-2 and deliver the same to the Owner prior to or contemporaneously with the execution of its contract with the Owner or on execution of the Subcontractor with the Construction Manager;

b. affirms it is enrolled in the "E-Verify" (formerly known as "Basic Pilot") work authorization program of the United States, and are participating in E-Verify with respect to your employees working in connection with the services being provided (to the extent allowed by E-Verify), or to be provided, by your company to the Owner or to the Construction Manager;

c. affirms that it is not knowingly employing any person who is an unauthorized alien in connection with the services being provided, or to be provided, by your company to the Owner or to the Construction Manager;

d. affirms you will notify the Owner or Construction Manager if you cease participation in E-Verify, or if there is any action, claim or compliant made against you alleging any violation of Missouri Revised Statute 285.530, or any regulations issued thereto;

e. agrees to provide documentation of your participation in E-Verify to the Owner and Construction Manager prior to or contemporaneously with the execution of its contract with the Owner or Construction Manager (or at any time thereafter upon request by the Owner), by providing to the Owner or Construction Manager an E-Verify screen print-out (or equivalent documentation) confirming your participation in E-Verify.

f. agrees to comply with any state or federal regulations that may be issued subsequent to this addendum that relate to Missouri Revised Statute 285.530; and

g. agrees that any failure by your company to abide by the requirements of a. through f. above will be considered a material breach of your contract with the Owner or Construction Manager.

By:_____(signature)

Printed Name and Title: _____

For and on behalf of: _____

Exhibit F-2

FEDERAL WORK AUTHORIZATION PROGRAM AFFIDAVIT

I, _____, being of legal age and having been duly sworn upon my oath, state the following facts are true:

1. I am more than twenty-one years of age; and have first-hand knowledge of the matters set forth herein.

2. I am employed by _____ (hereinafter "Company) and have authority to issue this affidavit on its behalf.

3. Company is enrolled in and participating in the United States E-Verify (formerly known as "Basic Pilot") federal work authorization program with respect to Company's employees working in connection with the services Company is providing to, or will provide to, the Owner or Construction Manager, to the extent allow by E-Verify.

4. Company does not knowingly employ any person who is an unauthorized alien in connection with the services Company is providing to, or will provide to, the Owner or Construction Manager.

FURTHER AFFIANT SAYETH NOT.

By: _____ (individual signature)

For: _____(company name)

Title: _____

Subscribed and sworn to before me on this _____ day of _____, 20___.

_____
NOTARY PUBLIC

My commission expires:

SECTION 00 53 00
MATERIAL AND EQUIPMENT CONTRACT

The M&E Contract may be modified from the form included to reflect Project-specific provisions required by the Owner. Otherwise, the M&E Contract shall not be changed from the form that is included. The Bidder shall include in its Bid all costs associated with executing the M&E Contract unconditionally and as provided in this Section.

BJD

MATERIAL AND EQUIPMENT CONTRACT

AGREEMENT

made this day of in the year Two-Thousand

BETWEEN the Contractor: J.E. Dunn Construction Company
1001 Locust
Kansas City, Missouri 64106

and the Supplier:

Project: Mid-Continent Public Library

JE Dunn Project #

Owner: Consolidated Library District #3
AKA Mid-Continent Public Library
15616 East Highway 24
Independence, Missouri 64050

Architect:

The Contractor and Supplier agree as set forth below.

ARTICLE I The Contract Documents for this Contract consist of this Agreement and any Exhibits attached hereto, the Agreement between the Owner and Contractor dated July 13, 2017, and the Conditions of the Contract between the Owner and Contractor (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda issued prior to execution of the Agreement between the Owner and Contractor, and all Modifications issued subsequent thereto.

All of the above documents are a part of this Contract and shall be available for inspection by the Supplier upon request. The Contract Drawings and Specifications and any addenda and Modifications issued prior to the execution of this Contract and applicable to it are enumerated in Exhibit A, attached.

ARTICLE II The Supplier shall furnish and deliver to the project the material and equipment listed in Exhibit B, Contract Sum and Scope of Work.

ARTICLE III The Contractor shall pay the Supplier for the performance of the Work, subject to additions and deductions by Change Order, the Contract Sum set forth in Exhibit B, Contract Sum and Scope of Work.

Unless authorization is given in writing by the Contractor for a change in the work, a request for payment for such change in work will not be honored.

ARTICLE IV The Contract Sum includes all applicable sales tax not eligible for exemption through use of Owner's Tax Exemption described in Exhibit C. Supplier shall be responsible to remit sales tax to the appropriate authorities and indemnify Contractor and Owner from any claims arising out of Supplier's failure to pay such tax. If the Contract Sum is subject to use tax, Supplier shall notify Contractor and Contractor will be responsible for payment of the use tax to the appropriate authorities.

ARTICLE V The Contractor shall pay the Supplier monthly progress payments. Pay estimates are to be submitted in accordance with Contract Documents. Applications for monthly progress payments shall be in writing, shall state the Work in this Contract that has been satisfactorily completed and shall be submitted to the Contractor on or before the twenty-fifth (25^{th}) day of each month.

The Contractor shall pay the Supplier each progress payment and the final payment under this Contract within five (5) working days after he receives payment from the Owner. The amount of each progress payment to the Supplier shall be equal to the amount allowed for materials and/or equipment suitably stored by the Supplier less the aggregate of previous payments to the Supplier and less the percentage retained as provided in the Contract Documents.

ARTICLE VI Before issuance of any payment the Supplier, if required, shall submit evidence satisfactory to the Contractor that all payrolls, bills for materials and equipment, and all known indebtedness connected with the Supplier's Work have been satisfied.

ARTICLE VII The Supplier warrants that all materials and/or equipment furnished by him to the Project shall be new unless otherwise specified, and that all Work under this Contract shall be of good quality, free from faults and defects and in conformance with the Contract Documents. All materials and/or equipment not conforming to these standards may be considered defective. Such warranty shall survive delivery and shall not be deemed waived either by reason of Contractor's acceptance of such materials or articles or by payment for them. Such warranty shall be in addition to and not in limitation of any other warranty or remedy required by law or by the Contract Documents.

ARTICLE VIII Should the Supplier at anytime refuse or neglect to supply a sufficiency of material and/or equipment of the proper quality, or fail in any respect to prosecute the work with promptness and diligence, or fail in the performance of any of the agreements herein contained, the Contractor shall be at liberty, after three (3) days written notice to the Supplier, to provide any such materials, and to deduct the cost thereof from any money then due or thereafter to become due to the Supplier under this Contract; and if the Contractor shall deem that such refusal, neglect or failure is sufficient grounds for such action, the Contractor shall also be at liberty to terminate the employment of the Supplier and to complete the performance of this Contract; and in case of such discontinuance the Supplier shall not be entitled to receive any further payment under this Contract until the said Work shall be wholly finished, at which time, if the unpaid balance of the amount to be paid under this Contract shall exceed the expense incurred by the Contractor,

completing the Contract, such excess shall be paid by the Contractor to the Supplier; but if such expense shall exceed such unpaid balance, the Supplier shall pay the difference to the Contractor. The expense incurred by the Contractor as herein provided shall include furnishing materials and any expense or other damages incurred through such default.

The supplier shall carry on his work so as not to delay the Contractor or its Subcontractors in any way, nor delay the completion and acceptance of the Project. To the extent the Contractor suffers damages or costs as a result of Supplier's performance or non-performance of the Work of this Contract, Contractor shall be entitled to assess such damages and costs against the Supplier.

ARTICLE IX SUPPLIER'S RESPONSIBILITIES

The Supplier shall be bound to the Contractor by the terms of this Agreement and of the Contract Documents between the Owner and Contractor and shall assume toward the Contractor all the obligations and responsibilities which the Contractor, by those Documents, assumes toward the Owner, including, but not limited to, obligations of indemnity, and shall have the benefit of all rights, remedies and redress against the Contractor which the Contractor, by those Documents, has against the Owner, insofar as applicable to this Supplier.

The Supplier shall pay for all materials, equipment and labor used in, or in connection with, the performance of this Contract and shall furnish satisfactory evidence, when requested by the Contractor, to verify compliance with the above requirements.

The Supplier shall make all claims promptly to the Contractor for additional work, extensions of time, and damage for delays or otherwise, in accordance with the Contract Documents, and in any event, at least two days prior to the date that the Contractor is required to submit a claim to Owner.

The Supplier shall promptly submit shop drawings and samples as required in order to perform his work efficiently, expeditiously and in a manner that will not cause delay in the progress of the Work of the Contractor, Subcontractors or other Suppliers.

The Supplier agrees to comply with the provisions of Executive Order 11246, as amended by order 11357, and Title VII of the 1964 Civil Rights Act.

The risk of loss for materials and equipment provided by Supplier, whether in a deliverable state or otherwise, shall remain with the Supplier until delivered to the jobsite and actually received by the Contractor, and any damages to the material and equipment or loss of any kind occasioned in transit shall be borne by the Supplier, notwithstanding the manner in which the goods are shipped or who pays the freight or other transportation costs.

Unless otherwise provided, all materials shipped to the jobsite in performance of this Contract shall be shipped prepaid. Failure to so ship and resultant claims by carriers against the Contractor for said shipping costs shall result in payment by Contractor for said charges and set-off against the Contract amount.

If at any time there shall be evidence of any invoice, bill, lien or claim (hereafter "claim") in respect to this Contract for which, if not paid by the Supplier, the Contractor or the Owner of the Project premises might become liable, the Contractor shall have the right to retain out of any payment then due or thereafter to become due an amount sufficient to completely indemnify against such claim. If, within 30 days, the Supplier has failed to resolve the claim for payment, or failed to provide a Bond to protect the Owner and Contractor against such claim, the Contractor shall have the right to make payment on such claim out of funds of the Supplier. If no such funds are available, the Supplier shall refund to the Contractor all monies that the latter has in good faith paid in discharging any such claim.

The Contractor may, at its option, terminate this Contract upon the filing by the Supplier, or the filing against Supplier, in any court pursuant to any statute of the United States or any state, of a petition in bankruptcy or insolvency, or for reorganization, or for appointment of a receiver of a trustee of all or a portion of Supplier's property or upon assignment by the Supplier of the work or funds due under or through this Contract.

ARTICLE X CONTRACTOR'S RESPONSIBILITIES

The Contractor shall be bound to the Supplier by the terms of this Agreement and of the Contract Documents between the Owner and the Contractor and shall assume toward the Supplier all the obligations and responsibilities that the Owner, by those Documents, assumes toward the Contractor, and shall have the benefit of all rights, remedies and redress against the Supplier, including, but not limited to, rights of indemnity, which the Owner, by those Documents, has against the Contractor, insofar as applicable to this Contract, provided that where any provision of the Contract Documents between the Owner and the Contractor is inconsistent with any provision in this Agreement, the Agreement shall govern.

The Contractor shall promptly notify the Supplier of all modifications to the Contract between the Owner and the Contractor which affect this Contract and which were issued or entered into subsequent to the execution of this Contract.

The Contractor shall permit the Supplier to be present and to submit evidence in any proceeding involving his rights.

ARTICLE XI All claims, disputes and other matters in questions arising out of, or relating to, this Contract, or the breach thereof, shall be decided in the same manner and under the same procedure as provided in the Contract Documents with respect to disputes between the Owner and the Contractor.

This Article shall not be deemed a limitation on any rights or remedies which the Supplier may have under any Federal or State mechanics' lien laws or under any applicable labor and material payment bonds unless such rights or remedies are expressly waived by him.

ARTICLE XII The Supplier shall not assign this Contract without the written consent of the Contractor, nor subcontract of the whole of this Contract without the written consent of the Contractor, nor further subcontract portions of this Contract without written notification to the Contractor. The Supplier shall not assign any amounts due or to become due under this Contract without the written approval of the Contractor.

ARTICLE XIII The Supplier will maintain all insurance required by the Contract Documents.

ARTICLE XIV For this Project, Supplier agrees to use Contractor's electronic delivery and signature process facilitated by a third-party administrator. The parties acknowledge and agree that such digital/electronic signatures shall have the same legal effect as a written signature. Supplier shall be solely responsible for ensuring that an authorized representative of Supplier signs the Contract and other documents utilizing Contractor's electronic signature process. Supplier agrees not to contest the validity or enforceability of any signature provided through Contractor's electronic signature process. Supplier also agrees to the electronic delivery of the fully executed Contract and other documents in a .pdf format via email. Either party may copy this completed Contract and other documents for electronic storage in a non-editable format. Contractor and Supplier each agree that following the electronic storage of these documents, any hard copy printout of the electronically stored information will constitute an original document.

List of Exhibits
Exhibit A – Contract Documents
Exhibit B – Contract Sum and Scope of Work
Exhibit C – Owner's Tax Exemption
Exhibit D – AIA A201-2007 General Conditions of the Contract for Construction, as modified

THIS AGREEMENT CONTAINS A BINDING ARBITRATION PROVISION WHICH MAY BE ENFORCED BY THE PARTIES.

This Agreement executed the day and year first written above.

CONTRACTOR: J. E. Dunn Construction Company	SUPPLIER:
BY: _____	BY: _____
Title:_____	Title:_____

EXHIBIT C
OWNER'S TAX EXEMPTION
MISSOURI

In order that the Owner may take advantage of its tax exemption, the Subcontractor/Supplier has been issued a copy of the Tax Exemption Letter issued by the State of Missouri and the Missouri Project Exemption Certificate issued by the Owner of this Project. The Subcontractor/Supplier shall make copies of these documents and provide them to each vendor and subcontractor from whom the Subcontractor/Supplier purchases tangible personal property and materials to be incorporated into or consumed in the construction of the Project. Proper use of such documents shall allow the Subcontractor/Supplier, subcontractors and vendors to make and pay for such purchases directly and without obligation to pay Missouri sales tax on such purchases. Subcontractor/Supplier hereby agrees to indemnify Owner and Contractor for any loss, damage, cost, or penalty assessed against it by the State of Missouri arising from Subcontractor's/Supplier's improper implementation of the tax exemption granted to this Project. NOTE: Invoices must indicate the name of the Exempt Entity and the Project # assigned to secure a valid tax exemption.

SECTION 00 61 13
PERFORMANCE AND PAYMENT BOND FORM

Surety Company MUST provide the following:

Bond No. _____

Phone No:_____

Fax No: _____

SUBCONTRACTOR PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS, That _____

_____
(Include Business Address)

(hereinafter called "Principal"), as Principal and _____

_____
(Include Business Address)_

organized and existing under the laws of the state of_____

(hereinafter called the "Surety"), as Surety, are held and firmly bound unto J.E. Dunn Construction Company,(hereinafter called the "Obligee") in the sum of_____

_____

($_____), for the payment of which sum well and truly to be made, the said Principal and Surety bind themselves, and their respective heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Obligee has been awarded a contract (hereinafter called the "Prime Contract").

by_____

_____

for_____

_____ and;

WHEREAS, the Principal has entered into a written subcontract with the Obligee, dated_____

_____to perform as Subcontractor, which Subcontract is hereby referred to and made a part hereof.

NOW THEREFORE, THE CONDITION OF THIS OBLIGATION IS SUCH, that if the Principal shall promptly make payment to all persons (a) supplying labor, services, utilities, equipment or any other goods or services, in the prosecution of the work provided for in said Subcontract and any and all modifications of said Subcontract that may hereafter be made; (b) pensions, welfare, vacation and/or supplemental employee benefit contributions payable under collective bargaining agreements with respect to person employed upon such work; (c) federal, state and local taxes and contributions required by law to be withheld or paid with respect to the employment of persons upon said work; and (d) otherwise fully indemnify and save Obligee from and against any claims or liens asserted by any party as a result of payment claimed due or concerning the subcontract, including attorney's fees and expenses, then this obligation shall be null and void; otherwise it shall remain in full force and effect.

The said Surety agrees that no change, extension of time, alteration, addition, omission, or other modification of the terms of either the said Subcontract or the said Prime Contract, or both, or in the said work to be performed, or in the specifications, or in the plans, shall in anywise change its obligation on this Bond, and it does hereby waive notice of any such changes, extensions of time, alterations, additions, omissions, and other modifications.

The said Principal and the said Surety agree that this Bond shall inure to the benefit of all persons supplying labor and material in the prosecution of the work provided for in said Subcontract, as well as to the Obligee, and that such persons may maintain independent actions upon this Bond In their own names.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several seals

this _____day of _____20, _____, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

_____ _____(Seal)
(Principal)

Witness: By_____
(Name & Title)

_____ _____
Or Secretary's Attest (Signature)

_____(Seal)
(Surety)

Witness: By_____
(Name & Title

_____ *_____
Or Secretary's Attest (Signature)

*Attach Power-of-Attorney

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Surety Company MUST provide the following:

Bond No. _____

Phone No:_____

Fax No: _____

SUBCONTRACTOR PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS, that_____

_____

(Include Business Address)

(hereinafter called the "Principal") as Principal and_____

_____

(Include Business Address)

organized and existing under the laws of the state of_____
(hereinafter called the "Surety"), as Surety, are held and firmly bound unto J.E. Dunn Construction Company.

_____

(hereinafter called the "Obligee") in the sum of_____dollars

and_____/Cents ($_____), for the payment of which sum well and truly to be made, the said Principal and Surety bind themselves, and their respective heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Obligee has been awarded a contract (hereinafter called the "Prime Contract"),

by_____

_____

for_____

_____and;

WHEREAS, the Principal has entered into a written Subcontract with the Obligee, dated_____ 20 _____

to perform, as Subcontractor, which Subcontract is hereby referred to and made a part hereof.

The Surety, for value received, agrees, if requested to do so by the Obligee, to perform fully all of the terms, conditions, obligations, undertakings, covenants, and agreements of the aforesaid Subcontract, as well as any duly authorized modification thereof (collectively, the "Subcontract Obligations"), if the Principal fails, neglects, or refuses to perform fully and complete the Subcontract Obligations. The Surety further agrees to commence the performance and completion of said Subcontract Obligations within ten (10) days after delivery of notice from the Obligee of the failure, neglect, or refusal of the Principal to perform and complete or cause to be performed and completed the Subcontract Obligations, and to perform and complete the same within the time required under said Subcontract (as well as any duly authorized modification thereof), as extended by the period of time elapsing between the date of such failure, neglect, or refusal of the Principal and the date of the delivery of such notice by the Obligee to the Surety. In the event the Surety does not undertake the performance or completion of the Subcontract Obligations, or cause them to be performed and completed within the time stated above, then the Obligee there upon shall have the remaining Subcontract Obligations performed and completed, Surety to remain liable hereunder for all costs and expenses, including attorney fees, at performance and completion.

It is expressly understood and acknowledged by the Surety that the term "Subcontract Obligations" in this Bond includes, but is not limited to: (i) any express or implied warranty obligations owed by the Subcontractor to the Obligee and (ii) any obligation contained in the Subcontract by which Subcontractor is to defend and/or indemnify Obligee against any losses, claims, demands or causes of action.

The Surety agrees that no change, extension of time, alteration, addition, omission, or other modification of the terms of either the Subcontract or the Prime Contract, or both, or in the work to be performed, or in the specifications, or in the plans, shall in any way change the Surety's obligation on this Bond, and the Surety does hereby waive notice of any such changes, extensions of time, alterations, additions, omissions, and other modifications.

The Principal and the Surety agree that this Bond shall inure to the benefit of Obligee, its successors and assigns, and that such persons may maintain independent actions upon the Bond in their own names.

IN WITNESS WHEREOF, the above bounden parties have executed this instrument under their several seals

this _____day of _____20,_____, the name and corporate seal of each corporate party being hereto affixed and these presents duly signed by its undersigned representative, pursuant to authority of its governing body.

_____ _____(Seal)
(Principal)

Witness: By_____
(Name & Title)

_____ _____
Or Secretary's Attest (Signature)

_____ _____(Seal)
(Surety)

By_____
(Name & Title)

_____ *
Or Secretary's Attest (Signature)

Rev. 2012 10 03

*Attach Power of Attorney

SECTION 00 62 00
SUBCONTRACTOR AND SUPPLIER PARTIAL WAIVER AND AFFIDAVIT
(Post-Payment/Unconditional)

Subcontractor/Supplier: _____

Project: MCPL - Work Package 10 - Colbern Road **Project No.** 17050710

Property (physical address of Project): 1000 NE Colbern Rd, Lee's Summit, MO 64086

Payment Application No. _____ **Payment Amount:** _____

Total Amount Paid: _____ **Subcontract Amount:** _____

Last date of work covered by the Payment Application: _____

Contractor: J.E. Dunn Construction Company

Beneficiaries: Contractor, Owner, and other parties, if any, having any interest in the Property

In consideration of the payment made by Contractor to the undersigned Subcontractor/Supplier in the Payment Amount set forth above for work, labor and services and/or materials furnished for the construction of the Project, the undersigned Subcontractor/Supplier, being familiar with the penalties for false certification, represents and certifies to the Beneficiaries that:

1. Subcontractor/Supplier a) irrevocably and unconditionally waives and releases the Property, Project and Beneficiaries from; and b) shall defend, indemnify and hold harmless the Property, Project, Beneficiaries, their sureties, guarantors and respective successors and assigns against:
   - any and all liens, statutory or otherwise, or rights thereof;
   - any and all obligations under any bond or guaranty for payment furnished to or by the Beneficiaries, whether pursuant to an agreement or required by law; and
   - any other claims of any kind whatsoever, statutory or otherwise, except as specifically claimed in accordance with the subcontract documents

   for any and all work, labor, material or equipment furnished by or through said Subcontractor/Supplier, its sub-subcontractors, suppliers, equipment providers and laborers and anything else in connection with the agreement between Contractor and Subcontractor/Supplier ("Subcontract"), through the last date of work covered by the Payment Application except as it pertains to unpaid retainage, if any.
2. The following listed persons or entities are the Subcontractor/Supplier's only sub-subcontractors, equipment providers, materialmen or suppliers for the Project. This partial waiver, or one similar, will be required for all sub-subcontractors, equipment providers, materialmen and suppliers for each payment application. Future payments may be delayed if all documents are not submitted properly.

COMPANY NAME (of your material suppliers and/or subcontractors)	**CONTRACT AMOUNT** (if unknown list N/A)	**AMOUNT PAID TO DATE** (cumulative amount)	**AMOUNT PAID THIS PERIOD** (thru date listed above)	**REMAING BALANCE LEFT ON CONTRACT**

_____ Write “none” here if no sub-subcontractors, equipment providers, materialmen or suppliers were used on this Project.

3. Payment in full, less retainage, if any, has been made by the Subcontractor/Supplier through the period covered by all payments (a) to all of the Subcontractor/Supplier’s sub-subcontractors, equipment providers, materialmen, suppliers and laborers, and (b) for all materials and labor used or furnished by the Subcontractor/Supplier in connection with the performance of the Subcontract, except as noted below:

COMPANY NAME (of your material suppliers and/or subcontractors not paid)	**AMOUNT NOT PAID**	**REASON WHY AMOUNT WAS NOT PAID**

4. Subcontractor/Supplier has complied with Federal, State and Local tax laws, including, without limitation, Income Tax Withholding, Sales Tax, Social Security, Unemployment Compensation and Worker’s Compensation laws, insofar as applicable to the performance of the Subcontract. Subcontractor/Supplier has paid, or out of the proceeds of the payment will promptly pay, all sales or use tax due and owing.
5. The undersigned is fully authorized and empowered to execute this instrument for and on behalf of said Subcontractor/Supplier and to bind it hereto and does in fact so execute this Partial Waiver and Affidavit. The undersigned acknowledges and agrees that the Beneficiaries or anyone on their behalf may and will act and rely upon this instrument in releasing any funds due or owing.

Subcontractor/Supplier: _____

By: _____

Title: _____

Date: _____

State of: _____County of: _____

On this _____ day of _____, 20_____, before me personally appeared _____, _____ of _____, known to me to be the person who executed this document and acknowledged to me that he/she executed the same for the purposes therein stated.

Notary Public in and for said County and State	Commission Expires

SECTION 00 62 00
BILL OF SALE

BUYER: J.E. Dunn Construction Company
1001 Locust St., Kansas City, MO 64106

SELLER: _____
_____
_____

PROJECT: _____
_____

In consideration of payments made by J.E. Dunn Construction Company ("Buyer") referenced in the agreement dated _____, 20_____ receipt of which is hereby acknowledged, Seller declares and certifies that it now possesses, and does hereby grant, sell, transfer, and deliver to Buyer, all right, title and interest in the following goods, material, chattel or equipment ("Goods"):

Description of Material	Estimated Material Quantity and Cost Required for Project	In Storage Beginning of Period Quant./Dollars	Added to Storage this Billing Quant./Dollars	Removed from Storage & Shipped to Site this Period Quant./Dollars	In storage at end of Period Quant./Dollars

As an alternative to completing the list above, include a copy or copies of invoices or other documentation providing the information requested above.

Buyer has all rights and title to the Goods in itself and its executors, administrators and assigns forever. Seller, on behalf of itself, its successors and assigns, will warrant and defend the title to said Goods hereby sold unto Buyer, its successors and assigns, forever, against the lawful claims and demands of all persons.

Buyer shall have free access to enter Seller's premises and to take possession of and utilize, sell, lease or otherwise dispose of the Goods in such a manner as Buyer, in its sole discretion, may elect.

Seller shall mark and identify the described Goods and shall segregate from and shall not commingle such Goods with other goods held by Seller. Seller shall protect and bear the risk of loss or damage to such Goods

until final completion and acceptance by Owner in accordance with the terms of the Subcontract/M&E Agreement. Seller, on behalf of its insurance companies insuring the property against loss, waives all rights of subrogation against Buyer.

It is expressly understood and agreed that the acceptance of the Goods described herein is not a waiver of any right of action that the Buyer may have for breach of warranty or any other cause under the Subcontract or M&E Agreement with Seller or at law.

In WITNESS WHEREOF, Seller has executed this Agreement the _____ day of

_____, 20__.

Seller: _____

By: _____

Title: _____

Subscribed and sworn to before me this ____ day of _____,20___.

_____

Notary Public in and for said County and State

My commission expires

_____

SECTION 00 62 00
NON-NEGOTIABLE BAILMENT RECEIPT

BAILOR: MID-CONTINENT PUBLIC LIBRARY
15616 E 24 HWY, INDEPENDENCE,
MO 64050-2057

BAILEE: Subcontractor/Supplier

LOCATION OF STORAGE: _____

The goods, equipment and materials described below are held and stored at the above referenced location pursuant to the Contract by and between Bailee, as Subcontractor/Supplier, and J.E. Dunn Construction Company, as Contractor, for Work to be performed at the MCPL - Work Package 10 - Colbern Road located at 1000 NE Colbern Rd, Lee's Summit, MO 64086. In consideration of payment made to the undersigned Bailee, the receipt and sufficiency of which are admitted, the Bailee agrees:

1. to keep said goods and materials at the above mentioned address, separate and apart from all other goods and identified as subject to this bailment,
2. to keep said goods and materials fully insured against all risk of physical loss or damage,
3. to keep said goods protected from the weather, commingling, vandalism, and/or diversion from said Project, and
4. to deliver said goods and materials to the Project site in conjunction with the performance of Bailee's Contract referenced above or upon the direction of Bailor or its Contractor and no other.

QUANTITY	DESCRIPTION OF ITEM

As an alternative to completing the list above, include a separate list or other documentation providing the information requested above.

The Bailee acknowledges that it has no ownership rights or title in, nor shall claim any lien upon, said goods and materials.

Agreed and Acknowledged:

Subcontractor/Supplier, Bailee

Dated: _____ By: _____

Authorized Signature

SECTION 00 62 76
APPLICATION AND CERTIFICATE FOR PAYMENT
AIA DOCUMENTS G702 and G703

AIA® Document G702™ – 1992

Application and Certificate for Payment

TO OWNER:

PROJECT: -

APPLICATION NO: 002
PERIOD TO:
CONTRACT FOR:
CONTRACT DATE:
PROJECT NOS: / /

Distribution to:
OWNER:
ARCHITECT:
CONTRACTOR:
FIELD:
OTHER:

FROM CONTRACTOR:

VIA ARCHITECT:

CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract.
Continuation Sheet, AIA Document G703, is attached.

1. ORIGINAL CONTRACT SUM		$ 0.00
2. NET CHANGE BY CHANGE ORDERS		$ 0.00
3. CONTRACT SUM TO DATE (Line 1 ± 2)		$ 0.00
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703)		$ 0.00
5. RETAINAGE:		
a. 0 % of Completed Work (Column D + E on G703)	$ 0.00	
b. 0 % of Stored Material (Column F on G703)	$ 0.00	
Total Retainage (Lines 5a + 5b or Total in Column I of G703)		$ 0.00
6. TOTAL EARNED LESS RETAINAGE (Line 4 Less Line 5 Total)		$ 0.00
7. LESS PREVIOUS CERTIFICATES FOR PAYMENT (Line 6 from prior Certificate)		$ 0.00
8. CURRENT PAYMENT DUE		$ 0.00
9. BALANCE TO FINISH, INCLUDING RETAINAGE (Line 3 less Line 6)	$ 0.00	

CHANGE ORDER SUMMARY	ADDITIONS	DEDUCTIONS
Total changes approved in previous months by Owner	$ 0.00	$ 0.00
Total approved this Month	$ 0.00	$ 0.00
TOTALS	$ 0.00	$ 0.00
NET CHANGES by Change Order	$ 0.00	

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

CONTRACTOR:

By: _____ Date: _____

State of:

County of:

Subscribed and sworn to before me this day of

Notary Public:

My Commission expires:

ARCHITECT'S CERTIFICATE FOR PAYMENT

In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED ..... $ 0.00

(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

ARCHITECT:

By: _____ Date: _____

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract.

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User Notes: (2020303663)

AIA® Document G703™ – 1992

Continuation Sheet

AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT, containing Contractor's signed certification is attached.
In tabulations below, amounts are in US dollars.
Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO: 001
APPLICATION DATE:
PERIOD TO:
ARCHITECT'S PROJECT NO:

A	B	C	D	E	F	G		H	I
ITEM NO.	DESCRIPTION OF WORK	SCHEDULED VALUE	WORK COMPLETED		MATERIALS PRESENTLY STORED (NOT IN D OR E)	TOTAL COMPLETED AND STORED TO DATE (D+E+F)	% (G ÷ C)	BALANCE TO FINISH (C - G)	RETAINAGE (IF VARIABLE RATE)
			FROM PREVIOUS APPLICATION (D + E)	THIS PERIOD					
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
		0.00	0.00	0.00	0.00	0.00	0.00 %	0.00	0.00
	GRAND TOTAL	$0.00	$0.00	$0.00	$0.00	$0.00	0.00 %	$0.00	$0.00

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User Notes:
(892030576)

SECTION 00 65 00
SUBCONTRACTOR AND SUPPLIER FINAL WAIVER AND AFFIDAVIT

(Post-Payment/Unconditional)

Subcontractor/Supplier: _____

Project: MCPL - Work Package 10 - Colbern Road **Project No.** 17050710

Property (physical address of Project): 1000 NE Colbern Rd, Lee's Summit, MO 64086

Payment Application No. _____ **Payment Amount:** _____

Total Amount Paid: _____ **Subcontract Amount:** _____

Last date of work covered by the Payment Application: _____

Contractor: J.E. Dunn Construction Company

Beneficiaries: **Contractor, Owner, and other parties, if any, having any interest in the Property**

In consideration of the payments made of the Final Payment Amount and all previous payment amounts by Contractor to the undersigned Subcontractor/Supplier for work, labor and services and/or materials furnished for the construction of the Project, the undersigned Subcontractor/Supplier, being familiar with the penalties for false certification, represents and certifies to the Beneficiaries that:

1. Subcontractor/Supplier a) irrevocably and unconditionally waives and releases the Property, Project and Beneficiaries from; and b) shall defend, indemnify and hold harmless the Property, Project, Beneficiaries, their sureties, guarantors and respective successors and assigns against:

- any and all liens, statutory or otherwise, or rights thereof;
- any and all obligations under any bond or guaranty for payment furnished to or by the Beneficiaries, whether pursuant to an agreement or required by law; and
- any other claims of any kind whatsoever, statutory or otherwise, except as specifically claimed in accordance with the subcontract documents.

for any and all work, labor, material or equipment furnished by or through said Subcontractor/Supplier, its sub-subcontractors, suppliers, equipment providers and laborers and anything else in connection with the agreement between Contractor and Subcontractor/Supplier ("Subcontract"), Property and Project.

2. The following listed persons or entities are the Subcontractor's or Supplier's only sub-subcontractors, equipment providers, materialmen or suppliers for the Project. This final waiver, or one similar, will be required for all sub-subcontractors, equipment providers, materialmen and suppliers.

COMPANY NAME (of your material suppliers and/or subcontractors)	**CONTRACT AMOUNT** (if unknown list N/A)	**AMOUNT PAID TO DATE** (cumulative amount)	**AMOUNT PAID THIS PERIOD** (thru date listed above)	**REMAING BALANCE LEFT ON CONTRACT**

_____ Write “none” here if no sub-subcontractors, equipment providers, materialmen or suppliers were used on this Project.

3. The Final Payment Amount and all previous payment amounts for the work and labor performed and material and equipment supplied on the Project represents the actual value of work and material provided under the terms of the Subcontract and all authorized changes thereto concerning work to be performed on the Property.

4. Payment in full has been made by the Subcontractor/Supplier through the periods covered by all prior payment applications (a) to all of the Subcontractor’s or Supplier’s sub-subcontractors, equipment providers, materialmen, suppliers and laborers, and (b) for all materials and labor used or furnished by the Subcontractor/Supplier in connection with the performance of the Subcontract, except as noted below:

COMPANY NAME (of your material suppliers and/or subcontractors not paid)	**AMOUNT NOT PAID**	**REASON WHY AMOUNT WAS NOT PAID**

5. Subcontractor/Supplier has complied with Federal, State and Local tax laws, including, without limitation, Income Tax Withholding, Sales Tax, Social Security, Unemployment Compensation and Worker’s Compensation laws, insofar as applicable to the performance of the Subcontract. The Subcontractor/Supplier has paid, or out of the proceeds of this payment will promptly pay, all sales or use tax due and owing.

6. The undersigned is fully authorized and empowered to execute this instrument for and on behalf of said Subcontractor/Supplier and to bind it hereto and does in fact so execute this Final Waiver & Affidavit. The undersigned acknowledges and agrees that the Beneficiaries, or anyone on their behalf, may and will act and rely upon this instrument in releasing any funds due or owing.

Subcontractor/Supplier: _____ By: _____

Title: _____ Date: _____

State of: _____ County of: _____

On this _____ day of _____, 20_____, before me

personally appeared _____,
_____ of _____,
known to me to be the person who executed this document and acknowledged to me that he/she executed the same for the purposes therein stated.

_____ _____

Notary Public in and for said County and State | Commission Expires

SECTION 00 72 00
GENERAL CONDITIONS

The AIA A201 shall serve as the General Conditions of the Contract.

AIA® Document A201™ – 2007

General Conditions of the Contract for Construction

for the following PROJECT:
(Name and location or address)
Mid-Continent Public Library

THE OWNER:
(Name and address)
Consolidated Library District #3 AKA Mid-Continent Public Library
15616 East Highway 24
Independence, Missouri 64050

THE ARCHITECT:
(Name and address)
SAPP Design Associates Architects PC
3750 S Fremont Avenue
Springfield, Missouri 65804

Helix Architecture & Design Inc
1629 Walnut
Kansas City, Missouri 64108

ADDITIONS AND DELETIONS:
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

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ARTICLE 1 GENERAL PROVISIONS

§ 1.1 BASIC DEFINITIONS

§ 1.1.1 THE CONTRACT DOCUMENTS

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of a Discrete Project to be performed under a separate Guaranteed Maximum Price Amendment, other documents listed in the Agreement and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding requirements.

§ 1.1.2 THE CONTRACT

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 THE WORK

The term "Work" means the construction and services required by the Contract Documents and set forth in each of the Guaranteed Maximum Price Amendments (hereinafter "GMPA" or "GMPA'S") for each Discrete Project or bundled Discrete Projects, whether completed or partially completed, and includes all other labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 THE PROJECT

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by separate contractors.

§ 1.1.5 THE DRAWINGS

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules and diagrams.

§ 1.1.6 THE SPECIFICATIONS

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services shall be provided by the Owner, through the Architect, for all Discrete Projects.

§ 1.1.7 INSTRUMENTS OF SERVICE

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 INITIAL DECISION MAKER

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2 and certify termination of the Agreement under Section 14.2.2.

§ 1.2 CORRELATION AND INTENT OF THE CONTRACT DOCUMENTS

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor.

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§ 1.2.2 Organization of the Specifications for any Discrete Project or bundled Discrete Projects into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 CAPITALIZATION

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 INTERPRETATION

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.5 OWNERSHIP AND USE OF DRAWINGS, SPECIFICATIONS AND OTHER INSTRUMENTS OF SERVICE

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the Instruments of Service provided to them solely and exclusively for execution of the Work on a Discrete Project or bundled Discrete Projects. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the Instruments of Service on other projects or for additions to this Project outside the scope of the Work on a Discrete Project or bundled Discrete Projects without the specific written consent of the Owner, Architect and the Architect's consultants.

§ 1.6 TRANSMISSION OF DATA IN DIGITAL FORM

The parties intend to transmit Instruments of Service or any other information or documentation in digital form. Owner, Architect and Construction Manager shall endeavor to establish necessary protocols governing such transmissions, unless otherwise already provided in the Agreement or the Contract Documents. Construction Manager shall host a secure web portal on which Instruments of Service and other information may be posted and viewed.

ARTICLE 2 OWNER

§ 2.1 GENERAL

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 INFORMATION AND SERVICES REQUIRED OF THE OWNER

§ 2.2.1 Prior to commencement of the Work, the Contractor may request in writing that the Owner provide reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract.

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§ 2.2.2 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities for each Discrete Project or Bundled Discrete Project.

§ 2.2.3 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the sites of a Discrete Project or bundled Discrete Projects, and a legal description of the site of each of the Discrete Projects as may be necessary for the construction of a Discrete Project or bundled Discrete Projects. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.2.4 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work of each of the Discrete Projects or bundled Discrete Projects with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.2.5 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for each of the Discrete Projects for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.3 OWNER'S RIGHT TO STOP THE WORK

If the Contractor fails to correct Work required by a Discrete Project or bundled Discrete Projects that is not in accordance with the requirements of the Contract Documents for such project as required by Section 12.2 or repeatedly fails to carry out Work required for such Discrete Project or bundled Discrete Projects in accordance with the Contract Documents for such Discrete Project or bundled Discrete Projects, the Owner may issue a written order to the Contractor to stop the Work on such Discrete Project or bundled Discrete Projects, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.4 OWNER'S RIGHT TO CARRY OUT THE WORK

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents for a Discrete Project or bundled Discrete Projects and fails within a ten-day period after receipt of written notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such deficiencies. In such case an appropriate Change Order shall be issued deducting from payments then or thereafter due the Contractor for such Discrete Project or bundled Discrete Projects contained within a GMPA, the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect or failure. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect. If payments then or thereafter due the Contractor are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner.

ARTICLE 3 CONTRACTOR

§ 3.1 GENERAL

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents for each such Discrete Project or bundled Discrete Projects contained within a GMPA.

§ 3.1.3 The Contractor shall not be relieved of obligations to perform the Work in accordance with the Contract Documents for a Discrete Project or bundled Discrete Projects contained in a GMPA either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

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§ 3.2 REVIEW OF CONTRACT DOCUMENTS AND FIELD CONDITIONS BY CONTRACTOR

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor is generally familiar with local conditions under which the Work for each Discrete Project or bundled Discrete Projects contained within a GMPA is to be performed.

§ 3.2.2 The Contractor shall, before starting of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.2.3, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall request a Change Order in accordance with Article 7 hereunder and provided that the request for a Change Order is denied shall make Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs to the Owner as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.3 SUPERVISION AND CONSTRUCTION PROCEDURES

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences and procedures and for coordinating all portions of the Work under the Contract, unless the Contract Documents give other specific instructions concerning these matters. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences or procedures, the Contractor shall evaluate the jobsite safety thereof and, except as stated below, shall be fully and solely responsible for the jobsite safety of such means, methods, techniques, sequences or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely written notice to the Owner and Architect and shall not proceed with that portion of the Work without further written instructions from the Architect. If the Contractor is then instructed to proceed with the required means, methods, techniques, sequences or procedures without acceptance of changes proposed by the Contractor, the Owner shall be responsible for any loss or damage arising from those Owner-required means, methods, techniques, sequences or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.4 LABOR AND MATERIALS

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, heating, water, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and

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whether or not incorporated or to be incorporated in the Work. Owner agrees to pay for all utilities for the renovation Projects and Contractor shall pay for the utilities as a Cost of Work on those Projects which are comprised solely of new construction.

§ 3.4.2 Except in the case of minor changes in the Work authorized by the Architect in accordance with Sections 3.12.8 or 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.5 WARRANTY

The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects in materials and workmanship, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.6 TAXES

The Project is tax exempt. Owner agrees to provide the Owner's Tax Exemption Certificate and will provide annual updates for such Tax Exemption Certificates as are necessary.

§ 3.7 PERMITS, FEES, NOTICES AND COMPLIANCE WITH LAWS

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded. Contractor shall be reimbursed as a Cost of the Work the fees for the building permits as well as for other permits, fees, licenses and inspections by government agencies necessary for proper execution and completion of the Work. Such costs for such fees, licenses, permits and government inspections shall be separately identified in each GMPA.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions. If the Contractor encounters conditions at a site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 21 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment to the Discrete Project Guaranteed Maximum Price Amendment in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor in writing, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may proceed as provided in Article 15.

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§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains, the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time to the GMPA for the Discrete Project or bundled Discrete Projects arising from the existence of such remains or features may be made as provided in Article 7 or Article 15.

§ 3.8 ALLOWANCES

§ 3.8.1 The Contractor shall include in the Contract Sum for each Discrete Project or bundled Discrete Projects contained within a GMPA all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

.1 Allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;

.2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit and other expenses contemplated for stated allowance amounts for each Discrete Project or bundled Discrete Project's GMPA shall be included in the Contract Sum but not in the allowances; and

.3 Whenever costs are more than or less than allowances, the Contract Sum for each Discrete Project or bundled Discrete Project's GMPA shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 SUPERINTENDENT

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project sites during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract but prior to submission of the Guaranteed Maximum Price Proposal for a Discrete Project or bundled Discrete Projects, shall furnish in writing to the Owner through the Architect the name and qualifications of a proposed superintendent for such Discrete Project or bundled Discrete Projects. The Architect may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to the proposed superintendent or (2) that the Architect requires additional time to review. Failure of the Architect to reply within the 14 day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 CONTRACTOR'S CONSTRUCTION SCHEDULES

§ 3.10.1 At the end of the Preconstruction Services Contractor shall prepare and submit for the Owner's and Architect's information a Contractor's general construction schedule for the Project. The schedule shall incorporate time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of the Work. In addition, Contractor shall submit with each GMPA, a construction schedule for the Work for each Discrete Project or bundled Discrete Projects which shall be included within each GMPA, which schedule shall not exceed time limits set forth in the construction schedule for the Project.

§ 3.10.2 The Contractor shall prepare a submittal schedule, promptly after execution of each Discrete Project or bundled Discrete Project GMPA and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect's approval. The Architect's approval shall not unreasonably be delayed or withheld.

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The submittal schedule shall (1) be coordinated with the Contractor's construction schedule for such Discrete Project or bundled Discrete Projects contained within a GMPA, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, for such Discrete Project or bundled Discrete Projects contained within a GMPA Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time for such GMPA based on the time required for review of submittals except to the extent that the Architect's review extends more than fifteen days after notice to the Architect that a timely review is needed.

§ 3.10.3 The Contractor shall perform the Work for such Discrete Project or bundled Discrete Projects contained within a GMPA in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.11 DOCUMENTS AND SAMPLES AT THE SITE

The Contractor shall maintain at the site for the Owner one copy of the Drawings, Specifications, Addenda, Change Orders and other Modifications, for each Discrete Project or bundled Discrete Projects contained within a GMPA in good order and marked currently to indicate field changes and selections made during construction, and one copy of approved Shop Drawings, Product Data, Samples and similar required submittals. These shall be available to the Architect and shall be delivered to the Architect for submittal to the Owner upon completion of the Work for each Discrete Project or bundled Discrete Projects contained within a GMPA as a record of such Work as constructed.

§ 3.12 SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work with respect to Discrete Project or bundled Discrete Projects contained within a GMPA.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment or workmanship and establish standards by which the Work with respect to a Discrete Project or bundled Discrete Projects contained within a GMPA will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples and similar submittals are not Contract Documents. Their purpose is to demonstrate the way by which the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work with respect to a Discrete Project or bundled Discrete Projects contained within a GMPA for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve and submit to the Architect Shop Drawings, Product Data, Samples and similar submittals required by the Contract Documents in accordance with the submittal schedule with respect to a Discrete Project or bundled Discrete Projects contained within a GMPA approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of separate contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so and (3) checked and coordinated the information contained within such submittals with the requirements of the Work with respect to a Discrete Project or bundled Discrete Projects contained within a GMPA and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work with respect to a Discrete Project or bundled Discrete Projects contained within a GMPA for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples or similar submittals until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work with respect to a Discrete Project or bundled Discrete Projects contained within a GMPA shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations

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from requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples or similar submittals unless the Contractor has specifically informed the Architect in writing of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples or similar submittals by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such written notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences and procedures. The Contractor shall not be required to provide professional services in violation of applicable law. If professional design services or certifications by a design professional related to systems, materials or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings and other submittals prepared by such professional. Shop Drawings and other submittals related to the Work designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, approve or take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

§ 3.13 USE OF SITE

The Contractor shall confine operations at the sites to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities and the Contract Documents and shall not unreasonably encumber the site with materials or equipment. The Owner shall identify such limitations prior to Contractor soliciting bids from Subcontractors for a Discrete Project or bundled Discrete Projects so that the schedule for such Work and restrictions on the performance of such Work can be disclosed by Contractor prior to receiving the bids for the Work on such Discrete Project or bundled Discrete Projects. The GMPA for each Discrete Project of bundled Discrete Project shall include any use of site restrictions.

§ 3.14 CUTTING AND PATCHING

§ 3.14.1 The Contractor shall be responsible for cutting, fitting or patching required to complete the Work with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA or to make its parts fit together properly. All areas requiring cutting, fitting and patching shall be restored to the condition existing prior to the cutting, fitting and patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA or fully or partially completed construction of the Owner or separate contractors by cutting, patching or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter such construction by the Owner or a separate contractor except with written consent of the Owner and of such separate contractor; such consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold from the Owner or a separate contractor the Contractor's consent to cutting or otherwise altering the Work with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA.

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§ 3.15 CLEANING UP

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about each Discrete Project or bundled Discrete Projects contained within a GMPA.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 ACCESS TO WORK

The Contractor shall provide the Owner and Architect access to the Work of each Discrete Project or bundled Discrete Projects contained within a GMPA, in preparation and progress wherever located.

§ 3.17 ROYALTIES, PATENTS AND COPYRIGHTS

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for such defense or loss when a particular design, process or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications or other documents prepared by the Owner or Architect. However, if the Contractor has reason to believe that the required design, process or product is an infringement of a copyright or a patent, the Contractor shall be responsible for such loss unless such information is promptly furnished to the Architect.

§ 3.18 INDEMNIFICATION

§ 3.18.1 To the fullest extent permitted by law the Contractor shall indemnify and hold harmless the Owner and its employees from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work of each Discrete Project or bundled Discrete Projects contained within a GMPA, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

ARTICLE 4 ARCHITECT

§ 4.1 GENERAL

§ 4.1.1 The Owner shall retain an architect lawfully licensed to practice architecture or an entity lawfully practicing architecture in the jurisdiction where the Project and each of the Discrete Projects are located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 4.1.2 Duties, responsibilities and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner, Contractor and Architect. Consent shall not be unreasonably withheld.

§ 4.1.3 If the employment of the Architect is terminated, the Owner shall employ a successor architect as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 4.2 ADMINISTRATION OF THE CONTRACT

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment with

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respect to each Discrete Project or bundled Discrete Projects contained within a GMPA and the Project. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work with respect to each Discrete Project or bundled Discrete Projects contained within a GMPA and the Project completed , and to determine in general if the Work with respect to each Discrete Project or bundled Discrete Projects contained within a GMPA and the Project observed is being performed in a manner indicating that the Work with respect to each Discrete Project or bundled Discrete Projects contained within a GMPA and the Project, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work with respect to each Discrete Project or bundled Discrete Projects contained within a GMPA and the Project. The Architect will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work with respect to each Discrete Project or bundled Discrete Projects contained within a GMPA and the Project, since these are solely the Contractor's rights and responsibilities under the Contract Documents, except as provided in Section 3.3.1.

§ 4.2.3 On the basis of the site visits. the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work with respect to each Discrete Project or bundled Discrete Projects contained within a GMPA and the Project completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work with respect to each Discrete Project or bundled Discrete Projects contained within a GMPA and the Project. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with respect to each Discrete Project or bundled Discrete Projects contained within a GMPA and the Project with the requirements of the Contract Documents. The Architect will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work with respect to each Discrete Project or bundled Discrete Projects contained within a GMPA and the Project.

§ 4.2.4 COMMUNICATIONS FACILITATING CONTRACT ADMINISTRATION

Owner and Contractor shall endeavor to communicate with each other directly and shall include the Architect as necessary about matters arising out of or relating to the Contract. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and material suppliers shall be through the Contractor. Communications by and with separate contractors shall be through the Owner.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA in accordance with Sections 13.5.2 and 13.5.3, whether or not such Work on such Discrete Project is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, material and equipment suppliers, their agents or employees, or other persons or entities performing portions of the Work on such Discrete Project or bundled Discrete Projects contained within a GMPA.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5 and 3.12. The Architect's review shall not constitute approval of safety precautions

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or, unless otherwise specifically stated by the Architect, of any construction means, methods, techniques, sequences or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may authorize minor changes in the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion of each Discrete Project and the Project or bundled Discrete Projects contained within a GMPA; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment with respect to each Discrete Project and the Project or bundled Discrete Projects contained within a GMPA pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more project representatives to assist in carrying out the Architect's responsibilities at the site. The duties, responsibilities and limitations of authority of such project representatives shall be as set forth in an exhibit to be incorporated in the Contract Documents.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 DEFINITIONS

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work with respect to each Discrete Project or bundled Discrete Projects contained within a GMPA at the site of such Discrete Project or bundled Discrete Projects contained within a GMPA. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work of a Discrete Project or bundled Discrete Projects contained within a GMPA at the site of such Discrete Project or bundled Discrete Projects contained within a GMPA. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 AWARD OF SUBCONTRACTS AND OTHER CONTRACTS FOR PORTIONS OF THE WORK

§ 5.2.1 Unless otherwise stated in the Contract Documents or the bidding requirements, the Contractor, as soon as practicable after award of the Contract, shall furnish in writing to the Owner through the Architect the names of persons or entities (including those who are to furnish materials or equipment fabricated to a special design) proposed for each principal portion of the Work for a Discrete Project or bundled Discrete Projects contained within a GMPA.

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The Architect shall reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect has reasonable objection to any such proposed person or entity or (2) that the Architect requires additional time for review. Failure of the Owner or Architect to reply within the 14 day period shall constitute notice of no reasonable objection. All Subcontractors shall be selected in accordance with applicable Missouri law. A notice of no reasonable objection shall in no way relieve the Contractor from full responsibility for performance and completion of the Work and its obligations under the Contract Documents. The Contractor shall be fully responsible for the performance of its Subcontractors, including those recommended or approved by Owner.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work on such Discrete Project or bundled Discrete Projects contained within a GMPA. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person or entity previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 SUBCONTRACTUAL RELATIONS

By appropriate agreement, written where legally required for validity, the Contractor shall require each Subcontractor, to the extent of the Work for each Discrete Project or bundled Discrete Projects contained within a GMPA to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work for such Discrete Project or bundled Discrete Projects contained within a GMPA, which the Contractor, by these Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work for such Discrete Project or bundled Discrete Projects contained within a GMPA to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 CONTINGENT ASSIGNMENT OF SUBCONTRACTS

§ 5.4.1 Each subcontract agreement for a portion of the Work for each Discrete Project or bundled Discrete Projects contained within a GMPA is assigned by the Contractor to the Owner, provided that

.1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and

.2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

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§ 5.4.2 Upon such assignment, if the Work of such Discrete Project or bundled Discrete Projects contained within a GMPA has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon such assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 OWNER'S RIGHT TO PERFORM CONSTRUCTION AND TO AWARD SEPARATE CONTRACTS

§ 6.1.1 The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and to award separate contracts in connection with other portions of the Project or other construction or operations on the site under Conditions of the Contract identical or substantially similar to these including those portions related to insurance and waiver of subrogation. If the Contractor claims that delay or additional cost is involved because of such action by the Owner, the Contractor shall make such Claim as provided in Article 15.

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each separate contractor with the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA of the Contractor, who shall cooperate with them. The Contractor shall participate with other separate contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to the construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, separate contractors and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces, the Owner shall be deemed to be subject to the same obligations and to have the same rights that apply to the Contractor under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6 and Articles 10, 11 and 12.

§ 6.2 MUTUAL RESPONSIBILITY

§ 6.2.1 The Contractor shall afford the Owner and separate contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work on a Discrete Project or bundled Discrete Projects contained within a GMPA depends for proper execution or results upon construction or operations by the Owner or a separate contractor, the Contractor shall, prior to proceeding with that portion of the Work on such Discrete Project or bundled Discrete Projects contained within a GMPA, promptly report to the Owner and the Architect apparent discrepancies or defects in such other construction that would render it unsuitable for such proper execution and results. Failure of the Contractor so to report shall constitute an acknowledgment that the Owner's or separate contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work on such Discrete Project or bundled Discrete Projects contained within a GMPA, except as to defects not then reasonably discoverable.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a separate contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a separate contractor's delays, improperly timed activities, damage to the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or separate contractors as provided in Section 10.2.5.

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§ 6.2.5 The Owner and each separate contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 OWNER'S RIGHT TO CLEAN UP

If a dispute arises among the Contractor, separate contractors and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 GENERAL

§ 7.1.1 Changes in the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA may be accomplished after execution of the Contract, and without invalidating the Contract or GMPA or GMPA'S, by Change Order, Construction Change Directive or order for a minor change in the Work on such Discrete Project or bundled Discrete Projects contained within a GMPA or GMPA'S, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor and Architect; a Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Construction Change Directive or order for a minor change in the Work on such Discrete Project or bundled Discrete Projects contained within a GMPA.

§ 7.2 CHANGE ORDERS

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor and Architect stating their agreement upon all of the following:

.1 The change in the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA;
.2 The amount of the adjustment, if any, in the Contract Sum; and
.3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 CONSTRUCTION CHANGE DIRECTIVES

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

.1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
.2 Unit prices stated in the Contract Documents or subsequently agreed upon;
.3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
.4 As provided in Section 7.3.7.

§ 7.3.4 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed in a proposed Change Order or Construction Change Directive so that application of such unit prices to quantities of Work on a Discrete Project or bundled Discrete Projects contained within a GMPA proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

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§ 7.3.5 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.6 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.7 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the method and the adjustment on the basis of reasonable expenditures and savings of those performing the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.7 shall be limited to the following:

.1 Costs of labor, including social security, old age and unemployment insurance, fringe benefits required by agreement or custom, and workers' compensation insurance;

.2 Costs of materials, supplies and equipment, including cost of transportation, whether incorporated or consumed;

.3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;

.4 Costs of premiums for all bonds and insurance, permit fees, and sales, use or similar taxes related to the Work; and

.5 Additional costs of supervision and field office personnel directly attributable to the change.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work on a Discrete Project or bundled Discrete Projects contained within a GMPA or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work on a Discrete Project or bundled Discrete Projects contained within a GMPA completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

§ 7.4 MINOR CHANGES IN THE WORK

The Architect has authority to order minor changes in the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such changes will be effected by written order signed by the Architect and shall be binding on the Owner and Contractor.

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ARTICLE 8 TIME

§ 8.1 DEFINITIONS

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA.

§ 8.1.2 The date of commencement of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion on a Discrete Project or bundled Discrete Projects contained within a GMPA is the date certified by the Architect in accordance with Section 9.8. The date of Final Completion is the date certified by the Architect in accordance with Section 9.10. Unless otherwise agreed to in writing by Owner, Contractor agrees that Final Completion shall occur no more than 30 days after the date of Substantial Completion.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 PROGRESS AND COMPLETION

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement the Contractor confirms that the Contract Time is a reasonable period for performing the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, prematurely commence operations on the site or elsewhere prior to the effective date of insurance required by Article 11 to be furnished by the Contractor and Owner. The date of commencement of the Work shall not be changed by the effective date of such insurance.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion on a Discrete Project or bundled Discrete Projects contained within a GMPA within the Contract Time for such Discrete Project or bundled Discrete Projects contained within a GMPA.

§ 8.3 DELAYS AND EXTENSIONS OF TIME

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA by an act or neglect of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner; or by changes ordered in the Work on a Discrete Project; or by labor disputes of Owner or Owner's other contractors, fire not caused by Contractor's negligent acts, unusual delay in deliveries, unavoidable casualties or other causes beyond the Contractor's control; or by delay authorized by the Owner pending mediation; or by other causes that the Architect determines may justify delay, then the Contract Time for such Discrete Project or bundled Discrete Projects contained within a GMPA shall be extended by Change Order for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents. This Agreement does preclude recovery of damages by the Contractor for any increase in expenses included in the General Conditions resulting from delay and extension of time due to adverse weather conditions.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 CONTRACT SUM

The Contract Sum is stated in the GMPA and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work for a Discrete Project or bundled Discrete Projects contained within a GMPA under the Contract Documents.

§ 9.2 SCHEDULE OF VALUES

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit to the Architect, before the first Application for Payment, a schedule of values allocating the entire Contract Sum to the

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various portions of the Work for each Discrete Project or bundled Discrete Projects contained within a GMPA and prepared in such form and supported by such data to substantiate its accuracy as the Architect may require. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 9.3 APPLICATIONS FOR PAYMENT

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment for a Discrete Project or bundled Discrete Projects contained within a GMPA prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work for a Discrete Project or bundled Discrete Projects contained within a GMPA. Such application shall be notarized, if required, and supported by such data substantiating the Contractor's right to payment as the Owner or Architect may require, such as copies of requisitions from Subcontractors for a Discrete Project or bundled Discrete Projects contained within a GMPA and material suppliers, and shall reflect retainage if provided for in the Contract Documents for such Discrete Project or bundled Discrete Projects contained within a GMPA.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work for a Discrete Project or bundled Discrete Projects contained within a GMPA that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA for which the Contractor does not intend to pay a Subcontractor or material supplier, unless such Work on such Discrete Project or bundled Discrete Projects contained within a GMPA has been performed by others whom the Contractor intends to pay.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work of a Discrete Project or bundled Discrete Projects contained within a GMPA. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage and transportation to the site for such materials and equipment stored off the site.

§ 9.3.3 The Contractor warrants that title to all Work on each Discrete Project or bundled Discrete Projects contained within a GMPA covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work on a Discrete Project or bundled Discrete Projects contained within a GMPA for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or encumbrances in favor of the Contractor, Subcontractors, material suppliers, or other persons or entities making a claim by reason of having provided labor, materials and equipment relating to the Work.

§ 9.4 CERTIFICATES FOR PAYMENT

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment on a Discrete Project or bundled Discrete Projects contained within a GMPA, either issue to the Owner a Certificate for Payment on such Discrete Project or bundled Discrete Projects contained within a GMPA, with a copy to the Contractor, for such amount as the Architect determines is properly due, or notify the Contractor and Owner in writing of the Architect's reasons for withholding certification in whole or in part as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment on a Discrete Project or bundled Discrete Projects contained within a GMPA will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work on such Discrete Project or bundled Discrete Projects contained within a GMPA and the data comprising the Application for Payment, that, to the best of the Architect's knowledge, information and belief, the Work on such Discrete Project or bundled Discrete Projects contained within a GMPA has progressed to the point indicated and that the quality of the Work on such Discrete Project is in accordance with the Contract Documents. The foregoing representations are subject to an evaluation of the Work on such Discrete Project or bundled Discrete Projects

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contained within a GMPA for conformance with the Contract Documents upon Substantial Completion of such Discrete Project or bundled Discrete Projects contained within a GMPA, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion and to specific qualifications expressed by the Architect. The issuance of a Certificate for Payment on such Discrete Project or bundled Discrete Projects contained within a GMPA will further constitute a representation that the Contractor is entitled to payment in the amount certified with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA, (2) reviewed construction means, methods, techniques, sequences or procedures, (3) reviewed copies of requisitions received from Subcontractors and material suppliers and other data requested by the Owner to substantiate the Contractor's right to payment, or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 DECISIONS TO WITHHOLD CERTIFICATION

§ 9.5.1 The Architect may withhold a Certificate for Payment with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount on such Discrete Project or bundled Discrete Projects contained within a GMPA, the Architect will promptly issue a Certificate for Payment on such Discrete Project for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

.1 defective Work on such Discrete Project or bundled Discrete Projects contained within a GMPA not remedied;

.2 third party claims filed or reasonable evidence indicating probable filing of such claims unless security acceptable to the Owner is provided by the Contractor;

.3 failure of the Contractor to make payments properly to Subcontractors or for labor, materials or equipment with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA;

.4 reasonable evidence that the Work on such Discrete Project or bundled Discrete Projects contained within a GMPA cannot be completed for the unpaid balance of the Contract Sum;

.5 damage to the Owner or a separate contractor with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA;

.6 reasonable evidence that the Work on such Discrete Project or bundled Discrete Projects contained within a GMPA will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or

.7 repeated failure to carry out the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA in accordance with the Contract Documents.

§ 9.5.2 When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.3 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or material or equipment suppliers with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA.

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§ 9.6 PROGRESS PAYMENTS

§ 9.6.1 After the Architect has issued a Certificate for Payment with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor no later than seven days after receipt of payment from the Owner on a Discrete Project or bundled Discrete Projects contained within a GMPA the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work on such Discrete Project or bundled Discrete Projects contained within a GMPA. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor on a Discrete Project or bundled Discrete Projects contained within a GMPA and action taken thereon by the Architect and Owner on account of portions of the Work with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and material and equipment suppliers on a Discrete Project or bundled Discrete Projects contained within a GMPA amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay or to see to the payment of money to a Subcontractor, except as may otherwise be required by law.

§ 9.6.5 Contractor payments to material and equipment suppliers on a Discrete Project or bundled Discrete Projects contained within a GMPA shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project on a Discrete Project or bundled Discrete Projects contained within a GMPA by the Owner shall not constitute acceptance of Work with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum with respect to a Discrete Project or bundled Discrete Projects contained within a GMPA, payments received by the Contractor for Work on such Discrete Project or bundled Discrete Projects contained within a GMPA properly performed by Subcontractors and suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner.

§ 9.7 FAILURE OF PAYMENT

If the Architect does not issue a Certificate for Payment with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA, through no fault of the Contractor, within fourteen days after receipt of the Contractor's Application for Payment on a Discrete Project or bundled Discrete Projects contained within a GMPA, or if the Owner does not pay the Contractor within fourteen days after the date established in the Contract Documents on such Discrete Project or bundled Discrete Projects contained within a GMPA the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' written notice to the Owner and Architect, stop the Work with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shut-down, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.8 SUBSTANTIAL COMPLETION

§ 9.8.1 Substantial Completion is the stage in the progress of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA when the Work or designated portion thereof is sufficiently complete in

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accordance with the Contract Documents so that the Owner can occupy or utilize the Work with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA for its intended use.

§ 9.8.2 When the Contractor considers that the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected on such Discrete Project or bundled Discrete Projects contained within a GMPA prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work on such Discrete Project or bundled Discrete Projects contained within a GMPA or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion on such Discrete Project or bundled Discrete Projects contained within a GMPA, complete or correct such item within 30 days after notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA.

§ 9.8.4 When the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion of such Discrete Project or bundled Discrete Projects contained within a GMPA, shall establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance, and shall fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work of such Discrete Project or bundled Discrete Projects contained within a GMPA or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA.

§ 9.8.5 The Certificate of Substantial Completion on a Discrete Project or bundled Discrete Projects contained within a GMPA shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in such Certificate. Upon such acceptance and consent of surety, if any, the Owner shall make payment of retainage applying to such Work or designated portion thereof. Such payment shall be adjusted for Work of such Discrete Project or bundled Discrete Projects contained within a GMPA that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 PARTIAL OCCUPANCY OR USE

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer as required under Section 11.3.1.5 and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance on a Discrete Project or bundled Discrete Projects contained within a GMPA, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion of a Discrete Project or bundled Discrete Projects contained within a GMPA substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor and Architect shall jointly inspect the area to be occupied or portion of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA to be used in order to determine and record the condition of the Work.

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§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work on a Discrete Project or bundled Discrete Projects contained within a GMPA not complying with the requirements of the Contract Documents nor shall it constitute evidence of Substantial Completion or Final Completion.

§ 9.9.4 In the event that Owner takes partial occupancy or installs furnishings and equipment prior to Substantial Completion of the of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA, Contractor shall obtain an endorsement to Contractor's Builder's Risk Policy to provide extended coverage for partial occupancy if Contractor's Builder's Risk Coverage required by Article 11 would not otherwise provide such coverage.

§ 9.10 FINAL COMPLETION AND FINAL PAYMENT

§ 9.10.1 Upon receipt of the Contractor's written notice that the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA is ready for final inspection and acceptance and upon receipt of a final Application for Payment , the Architect will promptly make such inspection and, when the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with terms and conditions of the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work of such Discrete Project or bundled Discrete Projects contained within a GMPA for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to the Owner, (3) a written statement that the Contractor knows of no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment and (5), if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts, releases and waivers of liens, claims, security interests or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien. If such lien remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging such lien, including all costs and reasonable attorneys' fees.

§ 9.10.3 If, after Substantial Completion of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect for such Discrete Project or bundled Discrete Projects contained within a GMPA prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

§ 9.10.4 The making of final payment on a Discrete Project or bundled Discrete Projects contained within a GMPA shall constitute a waiver of Claims by the Owner except those arising from

.1 liens, Claims, security interests or encumbrances arising out of the Contract and unsettled;

.2 failure of the Work with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA to comply with the requirements of the Contract Documents; or

.3 terms of special warranties required by the Contract Documents.

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§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor or material supplier shall constitute a waiver of claims by that payee on a Discrete Project or bundled Discrete Projects contained within a GMPA except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 SAFETY PRECAUTIONS AND PROGRAMS

The Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 SAFETY OF PERSONS AND PROPERTY

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury or loss to

.1 employees on the Work of a Discrete Project or bundled Discrete Projects contained within a GMPA and other persons who may be affected thereby;

.2 the Work and materials and equipment to be incorporated with respect to a Discrete Project or bundled Discrete Projects contained within a GMPA , whether in storage on or off the site, under care, custody or control of the Contractor or the Contractor's Subcontractors or Sub-subcontractors; and

.3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities bearing on safety of persons or property or their protection from damage, injury or loss.

§ 10.2.3 The Contractor shall erect and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards, promulgating safety regulations and notifying owners and users of adjacent sites and utilities.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment or unusual methods are necessary for execution of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3, except damage or loss attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

§ 10.2.8 INJURY OR DAMAGE TO PERSON OR PROPERTY

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, written notice of such injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

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§ 10.3 HAZARDOUS MATERIALS

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials. If the Contractor encounters a hazardous material or substance on a Discrete Project or bundled Discrete Projects contained within a GMPA that is not the responsibility of the Contractor as part of its Work and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to lead, asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work on such Discrete Project or bundled Discrete Projects contained within a GMPA in the affected area and report the condition to the Owner and Architect in writing.

§ 10.3.2 Upon receipt of the Contractor's written notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of such material or substance or who are to perform the task of removal or safe containment of such material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order , the Contract Time set forth in the GMPA shall be extended appropriately and the Contract Sum set forth in the GMPA shall be increased in the amount of the Contractor' s reasonable additional costs of shut-down, delay and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants and agents and employees of any of them on a Discrete Project or bundled Discrete Projects contained within a GMPA from and against claims, damages, losses and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for materials or substances the Contractor on a Discrete Project or bundled Discrete Projects contained within a GMPA brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for materials or substances required by the Contract Documents on a Discrete Project or bundled Discrete Projects contained within a GMPA, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall indemnify the Owner on a Discrete Project or bundled Discrete Projects contained within a GMPA for the cost and expense the Owner incurs (1) for remediation of a material or substance the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, the Contractor on a Discrete Project or bundled Discrete Projects contained within a GMPA is held liable for the cost of remediation of a hazardous material or substance by reason of performing Work as required by the Contract Documents, the Owner shall indemnify the Contractor, to the extent permitted by law, for all cost and expense thereby incurred, except to the extent such cost and expense is caused by the Contractor's negligence.

§ 10.4 EMERGENCIES

In an emergency affecting safety of persons or property on a Discrete Project or bundled Discrete Projects contained within a GMPA, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

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ARTICLE 11 INSURANCE AND BONDS

§ 11.1 CONTRACTOR'S LIABILITY INSURANCE

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Projects are located such insurance as will protect the Contractor from claims set forth below which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor on a Discrete Project or bundled Discrete Projects contained within a GMPA or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

.1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed;

.2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;

.3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;

.4 Claims for damages insured by usual personal injury liability coverage;

.5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;

.6 Claims for damages because of bodily injury, death of a person or property damage arising out of ownership, maintenance or use of a motor vehicle;

.7 Claims for bodily injury or property damage arising out of completed operations; and

.8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 shall be written for not less than limits of liability listed below. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, for two years after Substantial Completion of each Discrete Project or bundled Discrete Projects.

.a Workers' Compensation and Employer's Liability
State Statutory, as required by law
Employer's Liability $1,000,000

.b Commercial General Liability
$2,000,000 – Bodily Injury & Property Damage – Each Occurrence
$4,000,000 – General Aggregate Limit
$4,000,000 – Completed Operations Aggregate Limit

.c Automobile Liability
$1,000,000 – Combined Single Limit

.d Excess Liability
$5,000,000 – Bodily Injury & Property Damage Each Occurrence
$5,000,000 – Annual Aggregate Limit
$5,000,000 – Completed Operations Aggregate Limit

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA and on the Project and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled, decreased, or allowed to expire until at least 30 days' prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations on a Discrete Project or bundled Discrete Projects contained within a GMPA or on the Project, shall be submitted with the final Application for Payment on such Discrete Project or bundled Discrete Projects contained within a GMPA as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage until the expiration of the time required by Section 11.1.2.

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§ 11.1.4 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

§ 11.2 OWNER'S LIABILITY INSURANCE

The Owner shall be responsible for purchasing and maintaining the Owner's usual liability insurance.

§ 11.3 PROPERTY INSURANCE

§ 11.3.1 The Contractor shall purchase and maintain, in a company or companies lawfully authorized to do business in the jurisdiction in which the Projects are located, property insurance written on a builder's risk "all-risk" or equivalent policy form in the amount of Thirty Million Dollars ($30,000,000), the rolling value for Work of Discrete Project or bundled Discrete Projects contained within a GMPA under construction at the sites on a replacement cost basis. Such property insurance shall be maintained, unless otherwise provided in the Contract Documents or otherwise agreed in writing by Owner and Contractor, until no person or entity other than the Owner has an insurable interest in the property required by this Section 11.3 to be covered. This insurance shall include interests of the Owner, the Contractor, Subcontractors and Sub-subcontractors on Discrete Projects or bundled Discrete Projects contained within a GMPA while under construction.

§ 11.3.1.1 Property insurance shall be on an "all-risk" or equivalent policy form and shall include, without limitation, insurance against the perils of fire (with extended coverage) and physical loss or damage including, without duplication of coverage, theft, vandalism, malicious mischief, collapse, earthquake (subject to sublimit), flood (subject to sublimit), windstorm, falsework, testing and startup, temporary buildings and debris removal including demolition occasioned by enforcement of any applicable legal requirements, and shall cover reasonable compensation for Architect's and Contractor's services and expenses required as a result of such insured loss. Owner shall be a named additional insured under the property insurance policy.

§ 11.3.1.2 *(paragraph deleted)*

§ 11.3.1.3 *(paragraph deleted)*

§ 11.3.1.4 This property insurance shall cover portions of the Work for a Discrete Project or bundled Discrete Projects contained within a GMPA stored off the site, and also portions of the Work for a Discrete Project or bundled Discrete Projects contained within a GMPA in transit.

§ 11.3.1.5 Partial occupancy or use in accordance with Section 9.9 shall not commence until the insurance company or companies providing property insurance have consented to such partial occupancy or use by endorsement or otherwise. The Owner and the Contractor shall take reasonable steps to obtain consent of the insurance company or companies and shall, without mutual written consent, take no action with respect to partial occupancy or use that would cause cancellation, lapse or reduction of insurance.

§ 11.3.2 BOILER AND MACHINERY INSURANCE

The Owner shall purchase and maintain boiler and machinery insurance if such an exposure exists with respect to a Discrete Project or bundled Discrete Projects contained within a GMPA, which shall specifically cover such insured objects during installation and until final acceptance by the Owner; this insurance shall include interests of the Owner, Contractor, Subcontractors and Sub-subcontractors in the Work on such Discrete Project, and the Owner and Contractor shall be named insureds.

§ 11.3.3 LOSS OF USE INSURANCE

The Owner, at the Owner's option, may purchase and maintain such insurance as will insure the Owner against loss of use of the Owner's property due to fire or other hazards, however caused. The Owner waives all rights of action against the Contractor for loss of use of the Owner's property, including consequential losses due to fire or other hazards however caused. Such waiver shall not include a waiver of any liquidated damages for delay.

§ 11.3.4 *(paragraph deleted)*

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§ 11.3.5 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment on a Discrete Project or bundled Discrete Projects contained within a GMPA property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, the Owner shall waive all rights in accordance with the terms of Section 11.3.7 for damages caused by fire or other causes of loss covered by this separate property insurance. All separate policies shall provide this waiver of subrogation by endorsement or otherwise.

§ 11.3.6 Before an exposure to loss may occur, the Contractor shall file with the Owner proof of such insurance.

§ 11.3.7 WAIVERS OF SUBROGATION

The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents and employees, each of the other, and (2) the Architect, Architect's consultants, separate contractors described in Article 6, if any, and any of their subcontractors, sub-subcontractors, agents and employees, for damages caused by fire or other causes of loss to the extent covered by property insurance obtained pursuant to this Section 11.3 or other property insurance applicable to the Work of the Project or a Discrete Project or bundled Discrete Projects contained within a GMPA, except such rights as they have to proceeds of such insurance held by the Owner or Contractor as fiduciary. The Owner or Contractor, as appropriate, shall require of the Architect, Architect's consultants, separate contractors described in Article 6, if any, and the subcontractors, sub-subcontractors, agents and employees of any of them, by appropriate agreements, written where legally required for validity, similar waivers each in favor of other parties enumerated herein. The policies shall provide such waivers of subrogation by endorsement or otherwise. A waiver of subrogation shall be effective as to a person or entity even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, did not pay the insurance premium directly or indirectly, and whether or not the person or entity had an insurable interest in the property damaged.

§ 11.3.8 A loss insured under the property insurance shall be adjusted by the Contractor as fiduciary and made payable to the Contractor as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause. The Contractor shall pay Subcontractors their just shares of insurance proceeds received by the Contractor, and by appropriate agreements, written where legally required for validity, shall require Subcontractors to make payments to their Sub-subcontractors in similar manner.

(Paragraphs deleted)

§ 11.4 PERFORMANCE BOND AND PAYMENT BOND

§ 11.4.1 The Owner shall have the right to require the Contractor to furnish bonds covering faithful performance of the Contract and payment of obligations arising thereunder as stipulated in bidding requirements or specifically required in the Contract Documents on the date of execution of the Contract.

§ 11.4.2 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§11.4.3 Bonds shall be issued by a surety licensed to do business in the State of Missouri and otherwise acceptable to Owner. If at any time during the continuance of the Contract, the Owner determines that the Contractor is unable to complete the Work in accordance with the Contract Documents, any of the Contractor's bonds become insufficient, the surety becomes insolvent, or the surety's rating drops below the a level acceptable to Owner, Owner shall have the right to require from the Contractor additional and sufficient sureties or other security acceptable to the Owner, which the Contractor shall furnish to the satisfaction of the Owner within ten (10) days after notice to do so.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 UNCOVERING OF WORK

§ 12.1.1 If a portion of the Work of a Discrete Project or bundled Discrete Projects contained within a GMPA is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work of a Discrete Project or bundled Discrete Projects contained within a GMPA has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may

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request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, costs of uncovering and replacement shall, by appropriate Change Order, be at the Owner's expense. If such Work is not in accordance with the Contract Documents, such costs and the cost of correction shall be at the Contractor's expense unless the condition was caused by the Owner or a separate contractor in which event the Owner shall be responsible for payment of such costs.

§ 12.2 CORRECTION OF WORK

§ 12.2.1 BEFORE OR AFTER SUBSTANTIAL COMPLETION

The Contractor shall promptly correct Work of a Discrete Project or bundled Discrete Projects contained within a GMPA rejected by the Architect or failing to conform to the requirements of the Contract Documents, whether discovered before or after Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 AFTER SUBSTANTIAL COMPLETION

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of an applicable special warranty required by the Contract Documents, any of the Work on such Discrete Project or bundled Discrete Projects contained within a GMPA is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of written notice from the Owner to do so unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work relating to such Discrete Project or bundled Discrete Projects contained within a GMPA, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work on a Discrete Project or bundled Discrete Projects contained within a GMPA within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.4.

§ 12.2.2.2 The one-year period for correction of Work on a Discrete Project or bundled Discrete Projects contained within a GMPA shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA.

§ 12.2.2.3 The one-year period for correction of Work on a Discrete Project or bundled Discrete Projects contained within a GMPA shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents on a Discrete Project or bundled Discrete Projects contained within a GMPA and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction, whether completed or partially completed, of the Owner or separate contractors caused by the Contractor's correction or removal of Work on a Discrete Project or bundled Discrete Projects contained within a GMPA that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

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§ 12.3 ACCEPTANCE OF NONCONFORMING WORK

If the Owner prefers to accept Work on a Discrete Project or bundled Discrete Projects contained within a GMPA that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 GOVERNING LAW

The Contract shall be governed by the law of the State of Missouri.

§ 13.2 SUCCESSORS AND ASSIGNS

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns and legal representatives to covenants, agreements and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make such an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate such assignment.

§ 13.3 WRITTEN NOTICE

Written notice shall be deemed to have been duly served if delivered in person to the individual, to a member of the firm or entity, or to an officer of the corporation for which it was intended; or if delivered at, or sent by registered or certified mail or by courier service providing proof of delivery to, the last business address known to the party giving notice.

§ 13.4 RIGHTS AND REMEDIES

§ 13.4.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights and remedies otherwise imposed or available by law.
§ 13.4.2 No action or failure to act by the Owner, Architect or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach there under, except as may be specifically agreed in writing.

§ 13.5 TESTS AND INSPECTIONS

§ 13.5.1 Tests, inspections and approvals of portions of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of (1) tests, inspections or approvals that do not become requirements until after bids are received or negotiations concluded, and (2) tests, inspections or approvals where building codes or applicable laws or regulations prohibit the Owner from delegating their cost to the Contractor.

§ 13.5.2 If the Architect, Owner or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection or approval not included under Section 13.5.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection or approval by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.5.3, shall be at the Owner's expense.

§ 13.5.3 If such procedures for testing, inspection or approval under Sections 13.5.1 and 13.5.2 reveal failure of the portions of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA to comply with requirements established by the Contract Documents, all costs made necessary by such failure including those of repeated procedures and compensation for the Architect's services and expenses shall be at the Contractor's expense.

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§ 13.5.4 Required certificates of testing, inspection or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.5.5 If the Architect is to observe tests, inspections or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.5.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.6 Payments due and unpaid under the Contract Documents shall bear interest from the date thirty (30) days after the date payment is due at the rate of 5% per annum until payment is received.

§ 13.7 TIME LIMITS ON CLAIMS

The Owner and Contractor shall commence all claims and causes of action, whether in contract, tort, breach of warranty or otherwise, against the other arising out of or related to the Contract in accordance with the requirements of the final dispute resolution method selected in the Agreement within the time period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of a Discrete Project or bundled Discrete Projects contained within a GMPA of the Work. The Owner and Contractor waive all claims and causes of action not commenced in accordance with this Section 13.7.

§ 13.8 Contractor and each of its Subcontractors and their respective sub-subcontractors and material suppliers agree to comply with the provisions set forth in Exhibit B attached to the AIA 133 Agreement between Owner and Construction Manager, as Constructor. In addition to the Owner Requirements contained in Addendum No. 1. the Contractor and each Subcontractor and their respective Sub-Subcontractors shall comply in all respects with the prevailing wage law of the State of Missouri, as may be amended, and any federal prevailing wage laws that apply to the Work. The requirements of Missouri's prevailing wage law (Section 290.210 to 290.340, RSMo.) prevailing wage law rules (8CSR 30-3.010 to 8 CSR 30.060), Annual Wage Order issued by the Department of Labor and Industrial Relations, and any applicable Annual Incremental Wage Increases to the Annual Wage Order are hereby incorporated into this Contract and into all Subcontracts and Sub-Subcontracts and shall be collectively referred to as the Prevailing Wage Requirements. Owner shall not be responsible for assisting in providing any required documentation necessary to demonstrate compliance with the prevailing wage requirements by the Owner reserves the right to investigate any complaint and to audit payroll records of the Contractor, Subcontractor and any Sub-Subcontractor for the purpose of verifying compliance with the prevailing wage requirements, assessing statutory penalties for violation and or withholding any sums due any workmen. Owner may elect to require Contractor and Subcontractor and any Sub-Subcontractor to demonstrate compliance with prevailing wage requirements prior to tendering payment to the Contractor. Contractor shall contractually require that the Subcontractors and the Subcontractor's Sub-Subcontractors comply with this section to the same extent as Contractor is required to comply and shall ensure that not less that the legally required rates are paid to all workmen employed in the construction of the Work.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 TERMINATION BY THE CONTRACTOR

§ 14.1.1 The Contractor may terminate the Contract if the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work on such Discrete Project or bundled Discrete Projects contained within a GMPA under direct or indirect contract with the Contractor, for any of the following reasons:

.1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;

.2 An act of government, such as a declaration of national emergency that requires all Work to be stopped; or

.3 Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor or a Subcontractor, Sub-subcontractor or their agents or employees or any other persons or entities performing portions of the Work on a

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Discrete Project or bundled Discrete Projects contained within a GMPA under direct or indirect contract with the Contractor, repeated suspensions, delays or interruptions of the entire Work by the Owner as described in Section 14.3 constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' written notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, including reasonable overhead and profit on Work completed to the date of termination, costs incurred by reason of such termination, and damages.

§ 14.1.4 If the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA is stopped for a period of 60 consecutive days through no act or fault of the Contractor or a Subcontractor or their agents or employees or any other persons performing portions of the Work under contract with the Contractor because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' written notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 TERMINATION BY THE OWNER FOR CAUSE

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1 repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2 fails to make payment to Subcontractors for materials or labor in accordance with the respective agreements between the Contractor and the Subcontractors;
- .3 repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority;
- .4 otherwise is guilty of substantial breach of a provision of the Contract Documents; or
- .5 engages in conduct that would constitute a violation of state or federal criminal law, including but not limited to, the laws prohibiting certain gifts to public servants, or engages in conduct that would constitute a violation of the Owner's ethics or conflict of interest policies.

§ 14.2.2 When any of the above reasons exist, the Owner, upon certification by the Initial Decision Maker that sufficient cause exists to justify such action, may without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' written notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1 Exclude the Contractor from the sites and take possession of all materials and equipment thereon to be incorporated into the Project owned by Contractor;
- .2 Accept assignment of subcontracts pursuant to Section 5.4; and
- .3 Finish the Work with respect to a Discrete Project or bundled Discrete Projects contained within a GMPA by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished. Any further payment shall be limited to amounts earned to the date of termination.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 SUSPENSION BY THE OWNER FOR CONVENIENCE

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA in whole or in part for such period of time as the Owner may determine.

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§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay or interruption as described in Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

.1 that performance is, was or would have been so suspended, delayed or interrupted by another cause for which the Contractor is responsible; or

.2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 TERMINATION BY THE OWNER FOR CONVENIENCE

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of written notice from the Owner of such termination for the Owner's convenience, the Contractor shall

.1 cease operations as directed by the Owner in the notice;

.2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA; and

.3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders and cancel all unrequired insurance.

§ 14.4.3 In case of such termination for the Owner's convenience, the Contractor shall be entitled to receive payment for Work executed, and costs incurred by reason of such termination, along with reasonable overhead and profit on the Work with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA issued by Contractor but not yet executed by Owner.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 CLAIMS

§ 15.1.1 DEFINITION

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim.

§ 15.1.2 NOTICE OF CLAIMS

Claims by either the Owner or Contractor must be initiated by written notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party must be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3 CONTINUING CONTRACT PERFORMANCE

Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents. The Architect will prepare Change Orders and issue Certificates for Payment in accordance with the decisions of the Initial Decision Maker.

§ 15.1.4 CLAIMS FOR ADDITIONAL COST

If the Contractor wishes to make a Claim for an increase in the Contract Sum on a Discrete Project or bundled Discrete Projects contained within a GMPA, written notice as provided herein shall be given before proceeding to execute the Work with respect to such Discrete Project or bundled Discrete Projects contained within a GMPA. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.5 CLAIMS FOR ADDITIONAL TIME

§ 15.1.5.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, written notice as provided herein shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work on a Discrete Project or bundled Discrete Projects contained within a GMPA. In the case of a continuing delay, only one Claim is necessary.

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§ 15.1.5.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated and had an adverse effect on the scheduled construction. Weather conditions shall not be considered abnormal for a period of time unless critical path work could not be productively performed due to inclement weather for a period of time in excess of the following allowance days:

January	6 days	May	4 days	September	3 days
February	6 days	June	4 days	October	3 day
March	4 days	July	3 days	November	4 days
April	4 days	August	3 days	December	5 days

Contractor shall document in writing to Owner on a monthly basis for each Discrete Project or bundled Discrete Projects all days on which critical path work could not be productively performed due to the effects of inclement weather, in increments of ½ days. Unproductive days in excess of those set forth above shall be calculated and adjustments made to the Completion Date as set forth within the GMPA for a Discrete Project or bundled Discrete Projects.

§ 15.1.6 CLAIMS FOR CONSEQUENTIAL DAMAGES

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

.1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and

.2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.6 shall be deemed to preclude an award of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 INITIAL DECISION

§ 15.2.1 Claims, excluding those arising under Sections 10.3, and 10.4, , shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim arising prior to the date final payment is due, unless 30 days have passed after the Claim has been referred to the Initial Decision Maker with no decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of such request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

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§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time.

(Paragraph deleted)

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 MEDIATION

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.6 shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 ARBITRATION

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

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§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 CONSOLIDATION OR JOINDER

§ 15.4.4.1 Either party, at its sole discretion, may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Either party, at its sole discretion, may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as the Owner and Contractor under this Agreement.

End of Exhibit D

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SECTION 00 73 00
SPECIFIC PROJECT REQUIREMENTS

I.

1. GENERAL
    1. All work required by these Specific Project Requirements shall be included in the Subcontract Documents. In case of conflicts between the Specific Project Requirements and other Subcontract Documents, the more stringent requirements shall govern as determined and directed by the Contractor.
    2. Subcontractor will be required to attend preconstruction meetings, progress meetings and other meetings to review the Project. Items to be discussed during the progress meetings shall include, but are not limited to, schedule, safety, coordination issues, quality, security, RFI's, changes to the work etc as set forth below.
2. WORK HOURS
    1. Normal working hours on the project are Monday through Friday, 7:30 a.m. to 4:00 p.m. Contractor has the right to amend work hours as required or necessary to maintain project schedule or as seasonal and/or site work conditions warrant.
3. ELECTRONIC PROJECT CORRESPONDENCE AND COMMUNICATION
    1. Project communications and correspondence will occur electronically. This will include all project correspondence, meeting minutes, change documents, schedules, payment applications, submittals, etc.
    2. Subcontractors will be required to have internet access and to maintain an email address (of sufficient file size to receive drawings and .pdf files) for the purpose of managing communication and documents during the construction stage.
    3. A Project Web site administered by the Owner will be used for purposes of managing communication and documents during the construction stage.
4. BUILDING INFORMATION AND OTHER ELECTRONIC DATA
    1. The Architect and Contractor may utilize and provide the Subcontractor Building Information Modeling or other electronic data ("Electronic Data") for use in the Subcontractor's work during the course of the Project.
    2. The Electronic Data will be provided for informational purposes only. Subcontractor cannot not use or attempt to use the Electronic Data for any other project or purpose other than in connection with this Project.
    3. The Electronic Data shall not replace or supersede the record hard copy set of the drawings and other Subcontract Documents ("Paper Documents"). In the event of a conflict between the Paper Documents and the Electronic Data, the Paper Documents shall govern.
    4. Prior to receiving any Electronic Data, Subcontract will be required to complete and execute the Electronic Data Release included as Attachment A to this section or the Release required by the Architect if obtaining Electronic Data directly from the Architect or other design professional.
    5. See the attached CAD Coordination Program included as Attachment B.
    6. Subcontractor shall pay any fees for electronic files as defined in other Sections.
5. SUBMITTALS
    1. Refer to Division 01, Section "Submittal Procedure" for Specific Contract

Requirements Regarding Submittals.

2. Subcontractors are to submit all Shop Drawings, Product Data and Samples ("Submittals") to the Contractor bearing the Subcontractor's stamp indicating conformance to the Subcontract Documents and shall be signed by Subcontractor's representative.
3. Subcontractor is to submit the following to the Contractor:
    1. Shop Drawings - in PDF format via electronic files.
    2. Product Data - in PDF format via electronic files.
    3. Samples - 3 each of each differing type.
    4. Coordination Drawings - in PDF format via electronic files.
4. Contractor will return to the subcontractor:
    1. Shop Drawings - in PDF format via electronic files.
    2. Product Data - in PDF format via electronic files.
    3. Samples - 1 each of each differing type.
5. Subcontractor is required to forward Submittals to Contractor in a timely fashion for Contractor and Architect's review so as to maintain the Project Schedule. If a Submittal requires expediting to maintain the Project Schedule, a return date needs to be so noted on the transmittal.
6. Subcontractor is to forward all Submittals and Shop Drawings in electronic format – hard copies will not be accepted. Samples are to be clearly marked indicating appropriate information. All Submittals forwarded to Contractor are to be accompanied by a transmittal form/letter indicating quantity and description of information provided.

6. RECORD DOCUMENTS
    1. Refer to Division 01, Section "Submittal Procedures" for Specific Contract Requirements regarding Submittals.
    2. The Subcontractor is required to maintain at the Project site for the Contractor's and Owner's review current versions of the following:
        1. Drawings
        2. Specifications
        3. Addenda
        4. Change Orders
        5. Other Change Directives
        6. Approved Shop Drawings, Product Data and Samples
        7. Field Test Reports
        8. Meeting Notes
    3. Subcontractors will provide electronic redline drawings, specifications, submittals, etc. with "As-Built" information and return to the Contractor via CD or in PDF format via electronic files when the Subcontractor is substantially complete with its work.
7. PAYMENT PROCEDURES
    1. Refer to Division 01, Section "Payment Procedures" for specific contract requirements regarding Payment Procedures.
    2. Schedule of Values
        1. The Subcontractor will submit to the Contractor a Schedule of Values that includes all major categories of its work. Dollar amounts are to include all

labor, material, overhead and profit applicable to each item in the breakdown. Submit an electronic project Schedule of Values on an AIA Form G703 - Application and Certificate of Payment Continuation Sheet.

2. Submit an electronic Schedule of Values within seven (7) calendar days] after the date established in Notice of Award. The Schedule of Values shall list the installed value of the component parts of the work, broken down in sufficient detail to serve as a basis for computing values for progress payments during construction. The Schedule of Values should be broken down by area, building, floor, etc. in sufficient detail to evaluate progress payments. No payments will be processed prior to receipt of an approved Schedule of Values.
3. Add approved Change Orders to the electronic Schedule of Values for submission with each Application for Payment. List Change Orders in numerical sequence with a brief description of the change, with a reference to Contractor's Change Order No.
4. No progress payments will be made until the electronic Schedule of Values has been received, reviewed and approved by the Contractor. The costs assigned to the breakdown are to total the Subcontract Sum. The approved Schedule of Values is to be used by the Subcontractor on all Applications for Payment

3. Application for Progress Payments
    1. At a time consistent with the requirements of this section and the Subcontract Documents, and for each calendar month during the progress of the Work, the Subcontractor shall submit a properly notarized itemized Application for Payment prepared in a manner consistent with the Schedule of Values.
    2. The amount shown on the Application for Payment shall be established by adding the value of work completed through the last day of the application period based upon the Subcontractor's estimate of labor and materials to be incorporated in the Work by that date, and the value of the material/equipment suitably stored in accordance with the Subcontract Documents, less the aggregate of previous payments, and less the retainage as specified in the Subcontract.
    3. The form of application for payment shall be the AIA Document G702, "Application and Certificate for Payment", supported by AIA Document G703, "Continuation Sheet".
    4. Application Form. To sufficiently complete this form, the Subcontractor shall:
        1. Fill in all required information, including that for change orders executed prior to the date of submittal application.
        2. Fill in the summary of dollar values to agree with the respective totals indicated on the continuation sheet.
        3. Execute certificate with the signature of a responsible officer of the contractor's firm.
    5. Continuation Sheets. To sufficiently complete this form, the Subcontractor shall:
        1. Fill in total list of all scheduled component items of work, with each number and the scheduled dollar value of each item.

2. Fill in the dollar value in each column for each scheduled line item when work has been performed or products stored. Round off values to nearest dollar, or as specified in the Schedule of Values.
3. List each change order executed prior to the date of submission, at the end of the continuation sheets. List by change order number, proceed order no., description, and breakdown of costs as for an original component item of work.

6. Substantiating Data for Progress Payments
    1. Substantiating data is required to verify a payment request. Subcontractors are to include a cover letter identifying the:
        1. Project.
        2. Application number and date.
        3. Detailed list of enclosures.
        4. In order to bill for stored materials, Subcontract is required to provide certain documentation and adhere to specific procedures as follows:
        1.
            - Subcontractor shall mark and identify the subject materials and/or equipment and shall segregate from and shall not commingle such goods with other goods held by the Subcontractor.
            - Subcontractor shall submit evidence of insurance coverage on the material and/or equipment while stored at its warehouse or other approved facilities, naming Contractor and the Owner as Additional Insureds.
            - Subcontractor shall complete and submit a Bill of Sale form endorsed by a corporate officer or owner. The validity of the Bill of Sale is subject to Subcontractor's receipt of payment as referred to therein. A copy of the Bill of Sale is included in Section 00 62 00.
            - Subcontractor shall complete and submit a Non-negotiable Bailment Receipt. A copy of the approved Non-negotiable Bailment Receipt is included in Section 00 62 00.
    2. Submit one copy of the data cover letter for each of the applications.
    3. Applications for Payment shall be accompanied by cost breakdowns from the sub-subcontractors, the previous billing month's waivers from the sub-subcontractors and Material Suppliers, as applicable.
    4. When the Contractor finds the application properly completed and correct, it will transmit two (2) Certificates for Payment to the Architect to be certified for payment.
    5. Payment Application Documents:
        1. Cover Letter
        2. G702 and G703
        3. Subcontractor And Supplier Partial Waiver And Affidavit
        4. Non-negotiable Bailment Receipt (if stored material is being billed)
        5. Bill of Sale (if stored material is being billed)

6. Evidence of Insurance covering the stored material

4. Application for Final Payment
    1. Submit final Application for Payment following the procedures specified above for progress payments as set forth in the Subcontract Documents.
    2. Before submitting a final Application for Payment, the Subcontractor will be required to forward to the Contractor for submittal to the Architect, the written warranties and guarantees, Record and Information Manuals, and other documents required by the Contract (or Subcontract) Documents, and placed properly in approved storage at the site the extra stock and spare parts specified. Subcontractor will obtain the signature of the Contractor verifying receipt of the extra stock and spare parts.
    3. Properly executed “Subcontractor And Supplier Final Waiver And Affidavit” shall be submitted to the Contractor in duplicate prior to final payment.

8. CHANGES AND/OR CLARIFICATIONS
    1. Request for Information (RFI)
        1. If during the construction of the Project, clarification of the documents is required, it shall be brought to the attention of the Contractor. (Refer to Division 01, Section “Project Management and Coordination” for specific Contract requirements regarding RFI’s.).
        2. The Contractor will either provide clarification or forward a Request for Information (RFI) to the Architect. These RFI’s shall be dated and sequentially numbered. The Architect shall provide its written response to the RFI and return to the Contractor for distribution to all affected subcontractors or suppliers.
        3. If the RFI requires additional compensation, a response to an RFI is not an authorization to proceed with work. If additional compensation is required, the Subcontractor shall immediately advise the Contractor who will review the item with the Architect and Owner to determine if a Proposal Request will be issued.
    2. Minor Changes in the Work
        1. Refer to Division 01 Section “Contract Modification Procedures” for specific Contract requirements regarding minor changes in the Work. Prior to proceeding with any work described in an Architect’s Supplemental Instructions (ASI), the Subcontractors, or Suppliers shall confirm that these will not impact the cost or schedule. Proceeding with such work without confirmation will be deemed a waiver of Subcontractor’s or Supplier’s right to claim additional cost or time associated with the Minor Change in Work.
    3. Proposal Request (PR)
        1. Should the Owner contemplate making a change in the work, the Architect will issue a Proposal Request (PR) to the Contractor. (Refer to Division 01, Section “Contract Modification Procedures” for specific Contract requirements regarding Proposal Requests.).
        2. All PR’s will be reviewed and forwarded to the affected Subcontractors and Suppliers for review. Each Subcontractor will determine if the PR affects its Scope of Work. If the described change impacts cost and/or time, the Subcontractor or Supplier shall immediately prepare a proposal for

submission to the Contractor. The Subcontractor's proposal shall be broken down completely so as to identify all quantities and associated unit costs (both adds and deducts). The Contractor will review the pricing with the Owner and Architect to determine if a change order will be issued. Subcontractors are not to proceed with additional work until written authorization has been received.

4. Change Orders (CO)
    1. If the Owner determines that a Proposal Request will be accepted, the Architect will prepare a Change Order (CO) which will be dated and numbered sequentially. (Refer to Division 01, Section "Contract Modification Procedures" for specific Contract requirements regarding Change Orders.).
    2. The Change Order will describe the change or changes, will refer to the Proposal Request and proposal number, and will be signed by the Owner, the Architect and the Contractor.
5. Construction Change Directives (CCD)
    1. Refer to Division 01, Section "Contract Modification Procedures" and other Subcontract Documents for specific Contract requirements regarding Construction Change Directives (CCD). Construction Change Directive instructs the Contractor to proceed with a change in the work prior to concluding Contract adjustment negotiations.
6. Submission Of Proposals For Change Order - Follow other Contract Document requirements if more stringent than the requirements listed in this section.
    1. Labor Rate Breakdown:
        1. Base Rate Calculation: All Subcontractors will be required to substantiate all labor rates (for all skill levels and tradesmen) as actual cost plus allowable overhead and profit, prior to submitting change order pricing. Breakdowns shall include: base labor rate, fringes, union dues, payroll taxes and insurance. Any item not falling into one of these categories will be considered overhead and shall be included in the fee limits listed below.
        2. Premium on Overtime Rate Calculation: In the event overtime work is requested by the Contractor (not required by the Contract Documents or due to the fault of the Subcontractor), the premium on the overtime rate will be required to be substantiated as actual cost plus allowable overhead and profit. Breakdowns shall include: half of base labor rate, only the overtime premium portion of any applicable union fringes, and payroll taxes and insurance (excluding workers compensation insurance which is not paid on the premium portion of overtime). Any item not falling into one of these categories will be considered overhead and shall be included in the fee limits listed below.
    2. Method of Proposal:
        1. Comply with the requirements of this section and all other contract requirements.
        2. Include a direct reference to the change document in the proposal description. If the request is not linked to a change document, a full and thorough description of the work and the reason for the change

order request is required. Change requests not in this format will not be reviewed.

3. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
4. Indicate applicable taxes, delivery charges, equipment rental (rates and hours), and amounts of trade discounts.
5. Include costs of labor and supervision (as allowed by contract provisions) directly attributable to the change. Provide crew information including, labor rate for each skill level and trade, number of man-hours including estimating program back-up substantiating those hours.
6. Provide proposal detail and estimate which defines the type or area of work (i.e. Concrete: concrete walls, grade beams, piers, sidewalks, etc., Drywall: metal studs, rock, finishing, etc.).
7. Include substantiating back-up from second tier Subcontractors and Material Suppliers equal to the requirements of the Subcontractor proposal as described in this section.
8. Include all fee itemized separate from the detail described herein and in the limits described in this section.
9. Include an updated Subcontractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
10. Review and approval of a Subcontractors proposal for change order does not alleviate Subcontractors responsibility to provide accurate estimating, i.e. acceptance of pricing does not constitute acceptance of quantities, unit prices, man-hours, etc.

3. Fee Limits:
    1. Fee includes all general requirements, all supervision (including project management and general on site supervision), overhead and profit.
    2. The following fee percentages shall be used for lump sum pricing and actual cost pricing of additions and deletions to the work:
        1. To sub for work performed by own forces: not to exceed 10%
        2. To sub for work performed by other than own forces: not to exceed 5%
        3. To second tier subcontractor/material supplier for work performed by subcontractor's own forces: not to exceed 10%
        4. To second tier subcontractor/material supplier for work performed by other than subcontractor's own forces: not to exceed 5%
4. Pricing Validation:
    1. If the Work associated with a Subcontractor requested change order is performed, and in the opinion of the Owner, Architect, or Contractor, the Work does not adequately reflect the breakdown provided during pricing of the change, the Subcontractor may be asked and shall be required to substantiate man-hours, equipment, quantity, etc, to validate the change order pricing.

9. PROJECT MEETINGS
    1. Preconstruction Conference
        1. Contractor will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect.
            1. The conference will be conducted to review responsibilities and personnel assignments.
            2. Authorized representatives of Owner, Contractor, Architect, and their consultants; Subcontractor(s) and their superintendent; major sub-subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
            3. Contractor will discuss items of significance such as administrative items, procedural issues, site usage and requirements, schedule, jobsite rules and regulations, etc.
    2. Progress Meetings
        1. Progress Meetings, chaired by the Contractor, will be held regularly, on a weekly or bi-weekly basis as required to support the schedule. Attendance by the Subcontractor's onsite superintendent will be mandatory; however, an authorized representative of the Subcontractor, who can make decisions on the Subcontractors' behalf, must be present. At the direction of the Contractor, key Suppliers, sub-subcontractors and supervisors will be required to participate in the coordination and discussions and give summary reports of their activities.
        2. The progress meeting gives the Subcontractor the opportunity to discuss with the Contractor any problems or potential problems arising out of the Project. Each Subcontractor shall attend progress meetings as requested by the Contractor and shall come to the meeting prepared to discuss its work status and how it relates to the project schedule.
        3. The project schedule will be updated by the Contractor as indicated in the Project Manual and presented at the progress meetings. Each Subcontractor will be expected to discuss, as a minimum, the status of shop drawings, material and equipment delivery, job progress and quality control.
        4. Refer to Division 01, Section "Project Management and Coordination" for additional contract requirements regarding meetings.
    3. Pre-Installation Conference
        1. Contractor will conduct a pre-installation conference at Project site before each construction activity that requires coordination with other construction.
        2. Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. All Contractors (including field superintendents and/or foremen) performing or directly affected by a particular scope of work will be required to attend.
        3. Contractor will prepare the meeting agenda. Items for discussion will include review progress of other construction activities and preparations for the particular activity under consideration.

4. Coordination Meetings
    1. Contractor may conduct additional Project coordination meetings as needed to resolve issues or coordinate upcoming work. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.
5. MEP Overhead Coordination Meetings
    1. Contractor shall host MEP overhead coordination meetings as required by this Section. While the MEP Subcontractor shall have primary responsibility, all Subcontractors whose work impacts or is impacted by the MEP work will be required to attend applicable meetings
    2. Subcontractors shall comply with the coordination program identified in 4.5 in this section.

10. PROGRESS SCHEDULE
    1. Contractor will prepare a critical path schedule for construction including actual construction activities, submittals for major components, procurement of materials and equipment, and testing of major building systems and periodically update the progress schedule throughout the Project. (Refer to Division 01, Section “Project Management and Coordination” for specific contract requirements regarding scheduling.)
    2. Each Subcontractor is to submit within seven (7) calendar days after receiving its Notice to Proceed and prior to the preconstruction meeting, a schedule indicating durations for submittals, fabrication, delivery and installation of the components for its Scope of Work. This information will be utilized in the completion of the progress schedule presented at the progress meeting.
    3. As changes occur in the schedule information provided by the Subcontractors, the Subcontractor is responsible for forwarding the information to the Contractor immediately. The Contractor will utilize this information in issuing updates to the progress schedule.
    4. The Subcontractor it will substantially complete the work in accordance with the schedule developed by the Contractor. A construction milestone schedule has been included in Section 00 31 00. A detailed project schedule is available at Contractor’s office and is available for review by all Subcontractors.
    5. The Subcontract hereby agrees to commence work under the Contract within seven (7) days after the date of a Notice to Proceed, unless otherwise stipulated in that notice.
    6. Substantial Completion of the Work: The Subcontractor will have the work ready for either the following subcontractor’s work or the final inspection and Owner’s acceptance within the time limit stated in the Schedule and as defined in the scopes of work (reference Section 00 24 00)
11. LEAN CONSTRUCTION
    1. This Project will be built using a lean approach. Contractor's lean philosophy is to deliver the best value in the least wasteful way by creating a culture of continuous improvement that respects people. Contractor will implement a number of tools that promote and support this lean philosophy and approach which may include, but are not limited to, the Last Planner® System, 5S, continuous improvement programs, A3 reports, lessons learned - Do More/Do Better, BIM, prefabrication, 5-Why Root

Cause Analysis, Value Stream Mapping, Choosing by Advantages. Subcontractors will be required to participate in one or more Lean Training Sessions that will introduce and train on Contractor's lean approach and these tools. Subcontractors may be required to implement any and all lean tools on the Project. All field foremen/supervisors actively supervising the work on this Project will be required to attend the lean meetings on site. The cost and time associated with attending lean training and meetings and implementing lean tools are to be included in your Bid and/or subcontract price. Lean construction practices are only effective with complete participation by all Subcontractors, your full participation is required for the mutual benefit of Contractor and all Subcontractors.

2. Last Planner System
    1. This Project practices the Last Planner® System. All field foremen/supervisors and project managers for Subcontractors and Suppliers are required to attend pull planning sessions to collaboratively build the plan to reach each milestone in the Project schedule. There will be a pull plan for each milestone on the Project.
    2. At least three (3) weeks prior to starting your scope of work on the Project, it is mandatory that your key office and field staff attend weekly planning sessions. Once your work has commenced, you will be required to have your field foreman/supervisor attend the weekly planning meeting to proactively coordinate schedules with the other Subcontractors and Suppliers. Planning meetings will be conducted by Contractor's project superintendent at the jobsite.
    3. Fifteen (15) minute daily stand-up coordination meetings are held on-site. All foremen working on site are required to attend.
    4. Use of the Last Planner system may result in adjustment or advancement of the project schedule resulting from subcontractor coordination and planning. Subcontractors are to support any adjustments and advancements in the project schedule as a result of Last Planner with compensory shifting of manpower and material resources.

12. GENERAL REQUIREMENTS FOR WORKMANSHIP
    1. The Subcontractor is required to inspect jobsite, coordinate with other trades and field verify dimensions where applicable prior to fabricating product or material.
    2. Manufacturer’s requirements and industry standards are to be followed in regards to the effect of temperature, moisture and humidity on products and materials.
    3. Materials and equipment are to be installed plumb, level and true, with uniform joints and edge conditions, tight seams and neatly fitting adjoining materials, unless specifically shown otherwise.
    4. Materials and equipment are to be installed as dimensioned on the drawings. If dimensions or height are not dimensioned on the drawings, Subcontractor is to issue a RFI to the Contractor requesting location of item in question.
    5. Cleaning of materials and equipment shall be completed in a manner as not to damage the finish.
    6. Equipment and material shall be protected by Subcontractor following installation with labels intact until final cleaning.
13. GENERAL REQUIREMENTS FOR PRODUCTS AND MATERIALS

1. Refer to Division 01, Section “Substitution Procedures” for specific Contract requirements regarding substitutions.

14. QUALITY CONTROL AND INSPECTIONS

1. Refer to Division 01, Section Testing & Inspection Services?? for specific Contract requirements regarding testing and inspections.
2. The Subcontractor shall advise the Contractor's on-site field superintendent of all scheduled tests two (2) working days in advance.
3. The Subcontractor's quality control representative will review his drawings, procurement documents and contracts to ensure that the technical information provided and all work performed is in accordance with the latest revision of the Subcontract Documents. These documents shall be updated to reflect all changes made through Addenda, Change Orders and Requests for Information.
4. The Subcontractor's quality control representative will perform an inspection upon receipt at the site, of all materials, equipment and supplies. Items which are damaged or not in conformance with the respective Submittals, quality standards, Subcontract Documents, contract drawings and Specifications, will be identified and segregated from accepted items. Items thus identified will not be incorporated into the Work until corrective action, acceptable to the Contractor and Architect is completed.
5. The Subcontractor is responsible for the quality of the work performed by his work force and its sub-subcontractors, as well as the quality of the material, equipment and supplies furnished by the Subcontractor to be incorporated into the work. The Subcontractor will designate a quality control representative who will be on site at all times when work is in progress.

CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1. Personnel and Materials Hoisting
    1. Crane: The Contractor will not provide a crane for materials hoisting.
    2. Vertical material and personnel management: The Contractor will not provide a personnel hoist or scaffold stairs.
    3. Horizontal material management: No forklift will be available.
    4. Scaffolding: The Subcontractor shall provide all scaffolding (unless noted otherwise) required to complete its work.
    5. Lifts: The Subcontractor shall provide all lifts and other necessary equipment (unless noted otherwise) required to complete its work.
2. Disposal and Trash Removal
    1. The Contractor will provide dumpsters for Subcontractors use. Dumpsters may be allocated by material type. Subcontractor is responsible to sort debris to appropriate dumpster.
    2. Subcontractor will clean up and remove to designated points at the site, daily and as directed by the Contractor, all rubbish and debris resulting from the Subcontractor's work and shall clean up its work to the satisfaction of the Contractor.
    3. In the event the Subcontractor fails to clean up in accordance with the

directions, the Contractor, after [twenty-four (24) hours] written notice to the Subcontractor, reserves the right to arrange otherwise for the clean up to be done and charge the Subcontractor the cost.

4. Subcontractors shall ensure that all boxes, cartons, etc. are crushed to the minimum volume prior to placing in the trash containers or trash collection areas.
5. No paint cloths will be allowed in trash containers.
6. The disposal of any material, waste, effluents, trash, garbage or oil, grease, chemicals, etc. resulting from either demolition or new work, shall be disposed of in accordance with all applicable laws and shall be subject to the approval of the Contractor.
7. Contractor will coordinate progress cleaning for joint-use areas where more than one installer has worked.
8. An area will be designated for lunch and breaks. All food or drink, other than water, consumed on site must be in this pre-approved area and all waste disposed of in trash receptacles furnished by the Contractor. All food and drink, other than water, is prohibited in any other work area.

3. Temporary Toilets
    1. Temporary toilet facilities shall be furnished, and maintained as required by Contractor. The toilets shall be in sufficient number and at various locations to accommodate the workforce. The use of these toilet facilities by all members of the workforce is mandatory.
4. Temporary Water
    1. Contractor will pay all water utility bills on the project.
    2. The Plumbing Subcontractor will provide and maintain temporary potable water for the other Subcontractors' use throughout the building and at the jobsite as determined by Contractor.
    3. Subcontractor requiring additional temporary water service will be responsible to make arrangements for this work through the Plumbing Subcontractor and be subject to the approval of Contractor. Associated cost of additional water service will be paid by the Subcontractor requesting the service.
    4. It will be the responsibility of the Subcontractor utilizing temporary water to protect the Project against water damage. When using water, Subcontractor is required to use new materials and replace worn or broken parts. Hoses, fittings, etc. that are leaking shall be removed. Subcontractor will be responsible for the cost of damages arising from violation of this policy.
    5. Temporary water service shall be drained down and reactivated as required by the Plumbing Subcontractor to prevent freezing.
    6. No bulk water will be provided.
5. Temporary HVAC
    1. Temporary HVAC work includes, but is not limited to, caps for ductwork, temporary filters and filter media, necessary equipment warranty extensions, interim controls, fire watch, temporary stand alone smoke detectors for fan shut-down, ventilation and humidity control, monitoring of temperature and humidity, manual control of dampers (if required) and final clean-up of mechanical systems upon completion of construction work.

2. Ventilation and humidity control includes, but is not limited to, temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption. Relative humidity shall be controlled as required to reduce substrate moisture levels to level required to allow installation or application of finishes.
3. Heat required for specific work-oriented situations is to be provided by each subcontractor for its needs (i.e. masonry, EFIS, etc). General heating for creature comfort will not be provided by the Contractor.
4. Reference project specific temporary HVAC plan for the timeline of temporary conditioning inside the building.
5. Project Specific Temporary HVAC plan
    1. Mechanical subcontractor shall provide temporary heat and cooling (including ventilation and humidity control) during construction maintaining temperatures and humidity conducive to installation of the specified finishes.
    2. New and/or existing systems: The Owner will allow the use of new systems for temporary heating and cooling.
    3. Utility Charges for permanent equipment: Contractor will pay for utility charges incurred as a result of operating permanent equipment for temporary HVAC.
    4. Utility Charges for rental equipment: Subcontractor will pay for utility charges incurred as a result of operating rental equipment for temporary HVAC. Fuel charges will be the responsibility of the subcontractor providing the equipment.
    5. Humidity control: A heating load may be required to control relative humidity during summer conditions. In humid climates it may be necessary to provide additional moisture removal using dehumidification systems.
    6. Mechanical Subcontractor shall coordinate electrical requirements for temporary HVAC with the Electrical Subcontractor and other affected Subcontractors
    7. Reference Section 15.11 regarding safety issues during temporary conditioning/temporary heat.
    8. Use of permanent systems
        1. Subcontractors shall include necessary warranty extensions for all equipment utilized during temporary HVAC.
        2. Equipment safeties: Mechanical subcontractor shall provide stand alone fire alarm devices for AHU shut down as required for temporary heating and cooling. Coordinate any other fire alarm requirements with the Electrical Subcontractor. Other safeties may be required if circumstances dictate, such as: a high static safety on the leaving side of the fan ahead of first fire smoke damper to protect the duct work, a low pressure static safety on return duct applications with a return fan, freeze protection along

with control sequences to protect water coils. The leaving air temperature must be below dew point (approximately 55Âº) to provide adequate moisture removal. Discharge air temperature must remain constant due to the use of 100% outside air.

9. Reference Attachment C, Construction Indoor Air Quality for cleanup guidelines, ductwork cleanliness, and temporary heating and cooling guidelines for maintaining proper indoor air quality.

6. Temporary Electrical (Power, lighting, fire alarm)
    1. Contractor will pay usage costs for electrical power.
    2. Electrical Subcontractor will furnish, install, relocate, maintain and remove all necessary temporary wiring, lighting fixtures, protective devices, distribution panels, and transformers, etc. required for construction purposes conforming to rules and regulations of OSHA as well as other agencies having local jurisdiction. Work includes electrical power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations. [Electrical Subcontractor] shall coordinate temporary power requirements for trailers, equipment, and other special needs as required to execute the work. Reference paragraph 14.1 of this section for specific equipment. Each Subcontractor shall coordinate any further special temporary electrical requirements with Electrical Subcontractor.
    3. Electrical Subcontractor shall make all necessary arrangements with the utility company to provide temporary service. All electrical connections must meet local code requirements.
    4. All Subcontractors will be responsible for their power extension cords from the temporary panels to their work areas. These cords shall be three wire (including ground wire) of sufficient capacity for service intended and fully approved by all governing bodies.
    5. Each Subcontractor shall coordinate and pay for any further special temporary electrical requirements with the electrical subcontractor. Approval shall be provided by the Contractor.
    6. Electrical Subcontractor shall provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions. Lighting shall be as required by OSHA, but no but not less than one lamp per room. Minimum footcandles as defined by OSHA shall be maintained at all times.
    7. Electrical Subcontractor shall provide temporary lighting that fulfills security and protection requirements without operating entire system.
    8. Additional temporary light requirements (task lighting) shall be the responsibility of individual Subcontractors.
    9. When required by code or by the Owner, Electrical Subcontractor shall provide temporary fire alarm system tied into existing fire alarm control panel. This temporary system shall be completed and functional at all times. No part of the temporary system shall be used for the permanent system. Work includes removal and maintenance of the temporary system.
7. Temporary Communication Systems
    1. Telephones will not be provided at the site office of the Contractor.

Telephones will not be provided for tradesmen for their personal use.
2. Subcontractor shall provide radios for all supervisory personal. Radios shall be as defined by Contractor to allow for common frequency and open communication.
3. Subcontractors requiring telephone service must make their own arrangements, with the approval of Contractor.

8. Construction Fence
    1. Contractor will contract to erect and maintain a construction fence around the perimeter of the site and staging area as indicated on the site access plan. Fence gates will be located to provide access/egress as determined by Contractor. Subcontractor shall not remove sections of the fence without approval from Contractor. Subcontractors granted approval to remove a portion of the construction fence will be responsible to replace and restore those sections to the satisfaction of Contractor. Reference site access plan section 00 30 00 for further detail.
9. Temporary Onsite Structures
    1. Each Subcontractor shall make its own arrangements with the Contractor for office facilities as designated by the site access plan. Subcontractor shall provide, maintain and remove his own offices and storage facilities.
    2. Temporary power, telephone and water service requirements to its onsite structures shall be the responsibility of the individual Subcontractors. Services will be provided to a central location per the logistics plan for use by the Subcontractors.
10. Storage
    1. Onsite storage shall not be allowed except as specifically approved by the Contractor and as defined in the scope of work. Contractor will not assume any responsibility for any stored materials.
    2. If it becomes necessary at any time during construction to move materials which are to enter into construction or equipment and barricades which have been temporarily placed, the Subcontractor furnishing these materials, equipment or barricades shall, when directed by the Contractor, move them or cause them to be moved without additional charge to the Contractor.
11. Temporary Enclosures
    1. Any in progress or recently completed portions of work requiring protection from exposure to foul weather and detrimental operations shall be protected by the Subcontractor performing that work.
12. Fire Protection
    1. Contractor will provide fire extinguishers of proper type and number as required. Subcontractor shall provide firewatch as required to perform its work. Notify Contractor and Owner when welding, cutting or any activity that could create a fire hazard.
13. Surveying
    1. Benchmarks will be established and maintained by the Contractor. Any inconsistencies found in dimensions or elevations shall be reported to the Contractor before proceeding with work.
14. Site and Area Restrictions Reference site access plan described in Section 00 30

00.

1. Access and egress to and from the site is under the control and direction of Contractor. All Subcontractors will be responsible for advising Contractor of their delivery schedules and will coordinate the work of various Subcontractors as to minimize delays.
2. Limited Parking will be provided at the site per the site access plan.
3. Construct and maintain temporary roads and paved areas adequate for construction operations as described in the site access plan. At a time directed by the Contractor, remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction.
4. Traffic Controls: Comply with requirements of authorities having jurisdiction. Protect existing site improvements to remain including curbs, pavement, and utilities. Maintain access for fire-fighting equipment and access to fire hydrants.

15. Water and Snow Removal
    1. Dewatering Facilities and Drains: Each Subcontractor will be required to maintain the project site, excavations, and construction free of water to maintain progress of the work. Comply with requirements of authorities having jurisdiction.
16. Security And Protection Facilities Installation
    1. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to authorities having jurisdiction and Contract Documents.
    2. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
    3. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
    4. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction (and as required for adequate pedestrian and traffic safety) for erecting structurally adequate barricades, including warning signs and lighting.
    5. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
    6. Site Security: Site security will not be provided on the project.

SAFETY

1. General
    1. JE Dunn Safety: https://sms.jedunn.com/safety_program
    2. Safety on the project site is a primary concern to the Owner and Contractor. Each Subcontractor is responsible for the safety and security of its employees.
    3. All Subcontractors and lower tier subcontractors are required to follow all of

Contractor's safety requirements, OSHA, state and local safety regulations.
4. Each Subcontractor is responsible for providing the proper training and equipment necessary to ensure that their employees follow all of Contractor's safety requirements, OSHA, state and local safety requirements.
5. Each Subcontractor is responsible for inspecting their work areas periodically throughout the day for recognizable safety hazards and for taking immediate corrective actions to provide a safe work environment at the site.
6. Safety Representative - Each Subcontractor will assign a competent individual to act as the Subcontractor's safety representative. This individual must be on site and have the authority to immediately correct hazardous conditions. The name of the on-site representative shall be submitted to the Contractor prior to the Subcontractor beginning work.

2. Disciplinary Policy:
    1. Failure to follow safety requirements may result in disciplinary action up to and including the removal and replacement of employees and site foreman per Contractor's safety policy.
    2. Each Subcontractor is responsible for replacing foreman and employees who are unable or unwilling to follow the Project safety requirements.
    3. Each Subcontractor is responsible for enforcing its safety program and OSHA requirements as it relates to their work at the project.
    4. Failure to correct safety issues in a timely manner may result in Contractor directing a correcting Subcontractor to take action and a back charge may be issued to the creating contractor.
3. Training requirements:
    1. Copies of all training must be forwarded to the Contractor's site office. This documentation must include a detailed description of the items covered in the training and the signatures of the attendees.
4. Orientation:
    1. Each Subcontractor is responsible for providing each of its employees with an orientation prior to the start of work to familiarize its employee with the site, site safety requirements and specific safety policies and procedures as it applies to their work. Copies of all orientations must be forwarded to the Contractor's site office. This documentation must include a detailed description of the items covered in the orientation and the signatures of the attendees.
5. Task specific training:
    1. Task specific training must be provided by each Subcontractor to ensure that each employee knows how to perform their work in a safe manner.
    2. Task specific training must be conducted following the identification of a safety issue concerning a particular crew and weekly at a minimum.
6. MSDS:
    1. A copy of the MSDS program including a written program and a copy of the MSDS sheets for all products that will be used at the project must be provided to the Contractor prior to the start of Subcontractor's work at the Project.
7. Personal Protective Equipment:
    1. OSHA approved hard hats shall be worn by all personnel and visitors on the

jobsite at all times. Proper clothing shall be worn, suitable for construction work. Shirts and long pants shall be worn at all times. Durable work shoes are required; canvas or leather type athletic shoes and shoes without heels or toes are not permitted. All other personal protective equipment shall be furnished by the Subcontractor to its employees as required.

8. First Aid:
    1. The Contractor will maintain a first aid center at the Project office. The Contractor will have phone numbers of the local clinics and hospitals posted at all times.
9. Housekeeping:
    1. Good housekeeping shall be maintained at all times. All stripped lumber shall be safely stacked after nails have been removed or bent down. All stairways, scaffolds, ramps, walkways, and work areas shall be kept clear and clean of trash and material. Work areas shall be maintained free from accumulation of combustible trash.
    2. All Subcontractors are responsible for cleaning their work areas each day. Failure to clean work areas each day may result in Contractor directing a correcting Subcontractor to take action and a back charge may be issued to the creating contractor.
10. GFCI:
    1. Each Subcontractor is responsible for providing GFCI protection for their work when using generators or permanent electrical installations.
11. Temporary Conditioning/Temporary Heat:
    1. When temporary heat must be maintained during non-working hours, a competent person, agreed upon by Contractor, must be present to monitor heating equipment and take all necessary actions to prevent fire or respond to an emergency per the Contractor's Temporary Heat policy (available upon request). Each Subcontractor is responsible for any and all cost associated with this requirement as it applies to their work. Temporary heat is defined as any heating source that is powered by electricity (all types), LP gas, kerosene, fuel oil, and natural gas.
12. Electrical Contractor only:
    1. All electrical installations must be installed per applicable OSHA and NEC standards.
    2. Ground Fault Circuit Interrupters must be installed in all temporary installations.
    3. Lighting must be provided sufficiently and in a timely manner.

CODE OF CONDUCT

1. Because this Project may involve working in and around occupied facilities and/or public areas, Subcontractor and all of its employees are required to comply with the following:
    1. Subcontractor and its employees are expected to perform their work in a professional manner.
    2. Subcontractor is not to converse or talk with employees of Owner. All construction related questions are to be directed to Contractor.

3. Inappropriate language or gestures, profanity, or lewd conduct are strictly prohibited.
4. Tobacco use on the Project site must comply with the Ownerâ€™s restrictions. If there are no restrictions, tobacco must be kept to a minimum so as to not damage the Project or litter the site. Smoking is restricted to designated areas, if any. Violations of this policy may result in tobacco use being prohibited on the Project site.
5. Subcontractor parking is only allowed in areas designated by Contractor.

2. Violations of this policy could result in immediate dismissal from the site.

CONTRACT CLOSE-OUT

1. Refer to Division 01, Section 01 77 00 for specific Contract requirements regarding project closeout.
2. Refer to Division 01, Section 01 79 10 for specific Contract requirements regarding warranties.

SECTION 00 73 00
SPECIFIC PROJECT REQUIREMENTS
ATTACHMENT A
ELECTRONIC DATA RELEASE

[If not included in Division 01 from the Designers, attach Design Professional Release documents to this document as Attachment A.1 (for example: Arch, Civil, Structural, MEP, etc)]

Project:	MCPL - Work Package 10 - Colbern Road
Owner:	MID-CONTINENT PUBLIC LIBRARY
Architect/Engineer:	SAPP DESIGN ASSOCIATES ARCHITECTS PC
Contractor:	J.E. Dunn Construction Company
Subcontractor:	[_____]

The Subcontractor has requested and the Contractor has agreed to provide copies of electronic data files, which may include building information modeling (BIM) data and drawings, ("Electronic Files") for the Project.

In consideration of Contractor providing a copy of the Electronic Files to Subcontractor, Subcontractor agrees to the following:

1. The Subcontractor acknowledges the Electronic Files shall not replace or supersede the record hardcopy set of the drawings and other Subcontract Documents ("Paper Documents"). In the event of a conflict between the Paper Documents and the Electronic Files, the Paper Documents shall govern. The Subcontractor shall be deemed to have used the Paper Documents in performing its Work.
2. The Subcontractor may use the Electronic Files for informational purposes only and agrees to make no modifications to the Electronic Files and shall return all copies of the Electronic Files, if requested. Subcontractor shall not use or attempt to use the Electronic Files for any other project or any purpose other than in connection with the Project.
3. The Subcontractor agrees to defend, indemnify and hold the Owner, Architect/Engineer and Contractor harmless in connection with any defects contained in the Electronic Files and any claims arising out of the use of the Electronic Files.
4. If the Contractor has executed a release agreement with a design professional (Design Professional Release) affecting the documents that will be provided under this Release, the Subcontractor shall be bound to the Contractor by the terms of this Release and those of the Design Professional Release, which shall be attached as an exhibit to this Release or otherwise made available to Subcontractor, and shall assume toward the Contractor all the obligations and responsibilities which the Contractor, by the Design Professional Release, assumes toward the design professional, insofar as applicable to this Subcontractor.

Accepted and agreed:

_____

Subcontractor Name (typed or printed)

_____

Authorized Signature of Subcontractor Date: _____

SECTION 00 73 00
SPECIFIC PROJECT REQUIREMENTS
ATTACHMENT B
COORDINATION PROGRAM

DOCUMENT 007300 – Attachment B

3D BIM MODEL COORDINATION PROGRAM

I. BUILDING INFORMATION MODELING (BIM) PROCEDURES

In general, the scope of work under this coordination program is to create a technically accurate and detailed BIM/3D computer model of the architectural, structural, mechanical, plumbing, physical security, fire protection, civil, electrical, equipment suppliers and other pertinent scopes of the project identified herein.

If required by the Client or project/contact type, development of a project specific BIM execution plan will occur on or before approximately 60 days after award to establish the overall objective (e.g., facilities management) and to ensure such objectives will be met prior to sketching, drafting or modeling. Defining the objective is critical to the overall project's success and maximizing participant's effectiveness and efficiencies by eliminating the need for redundant work.

A. Modeling Expectations

1. It is the Contractor's preference that the Architect and the Architect's consultants provide 2D CAD backgrounds and 3D exported drawing models from their Revit models for the subcontractors' use. The Contractor will provide 2D CAD background files and/or exported 3D drawing models from the Architect's and the Architect's consultant's Revit models if the Architect or the Architect's consultants choose not to provide these.
2. The Contractor will be the Information Manager (IM) and will execute coordination using the Contractor's clash management workflow, which includes: Autodesk BIM 360 Glue, Autodesk Navisworks Manage, and the Contractor's clash management module. All subcontractors shall use software that can be compatible with both Autodesk BIM 360 Glue and Autodesk Navisworks Manage.
3. The insertion point is typically defined in the BIM Execution Plan. If a BIM Execution Plan is not required, then the project insertion point will be defined by Contractor and subcontractors at the BIM coordination kick-off meeting.
4. Project participants will be provided access to all the Contractor's cloud-based technologies.
5. Project participants are required to upload models to Autodesk BIM 360 Glue project site as determined during the BIM coordination kick-off meeting. Subcontractors are required to upload files to BIM 360 Glue project site with the correct naming convention as defined in the BIM Execution Plan.

3D BIM MODEL COORDINATION PROGRAM

B. File Naming Conventions: All subcontractors shall use the file naming conventions as follows.

3-Letter Firm Acronym-4-Letter Discipline-Area
Example: JED-CONC-Level 1

Disciplines in general are listed below but not limited to:

Steel	STEL
Sheet metal	DUCT
Plumbing	PLUM
Pipe	PIPE
Electrical	ELEC
Fire Protection	FIRE
Med Gas	MGAS

1. Subcontractors are required to model all components in their contracted Scope of Work as defined in Section D of this document, the project BIM execution plan, and level of detail (LOD) specification. If there is a discrepancy in LOD requirements between documents, whichever document is of greater detail will govern. A subcontractor choosing not to include model detail as outlined in the project BIM coordination program will be solely responsible to field coordinate their systems, access and clearance zones, conflicts, and design review comments as a result of not modeling these components as part of the BIM coordination process. Systems and routing included in the project BIM model will have precedence over field coordinated items. In the case where procurement and installation are under different contracts; the subcontractor for procurement is responsible for BIM modeling and coordination.
2. The project insertion point will at grid intersection A-1 and elevation 0'-0", unless otherwise agreed to by all stakeholders.
3. All files will be in a 3-D solid object format. No wire frame or poly-mesh objects will be accepted.

C. Model Creators

1. Architectural – by Architect
2. Cast-in-place Concrete – by Architect or Architect's consultant
3. Precast Concrete – by Architect and supplier
4. Structural Steel – by Architect or architect's consultant and supplier
5. Mechanical - by mechanical subcontractor
6. Plumbing – by plumbing subcontractor
7. Electrical – by electrical subcontractor
8. Fire Protection – by fire protection sprinkler subcontractor
9. Low Voltage - by Low Voltage subcontractor
10. Glass and Glazing- by Architect and/or glass and glazing subcontractor
11. Specialty Contractor/Equipment - by specialty subcontractor

D. Extent of Final Model

The Coordination Model will be created and managed by the Contractor. The BIM model shall extend to five feet beyond the exterior walls of the building plan. Vertically the model shall extend from the lowest extent of the foundation or lowest underground utility, whichever is greater, and up through roof including roof-top mounted equipment.

E. If site utility coordination is required, the horizontal extent of the model will be expanded as needed.

F. Model Level of Development

1. *Architectural*
   a. All interior/exterior walls
   b. All interior and exterior doors and windows
   c. All fixed casework
   d. All roofs
   e. All floors
   f. All ramps, stairs, and railings
   g. All ceilings and soffits –including overall thickness, elevation changes, and termination points
   h. Plumbing fixtures/Toilet Partitions
   i. Architectural items pertinent to design and coordination will be modeled on an as-needed basis

2. *Structural – Concrete and Steel*
   a. All cast-in-place concrete, including all penetrations and openings. Chamfers at corners and slab camber will not be reflected in the model
   b. Edges of slabs and penetrations of structural systems shall be accurately located in the model. Actual size and location will be verified during the BIM coordination process.
   c. All primary and secondary structural steel members
      Other structural elements included, but not limited to, include:
      1. standard steel member sizes
      2. oversized braces and large kickers
      3. embeds
      4. reinforcing steel
      5. steel joists, which shall include webbing, bridging and bracing
   d. Metal and concrete decks as the overall thickness of the slab, but not necessary to include ribs in metal deck or bolts.
   e. Minor kickers, gusset plates, and base plates

3. *HVAC – Division 23*
   a. All ducts and air handling equipment. Ducts modeled to outside face dimension of the sheet metal, flanges, insulation; whichever dimension is greater. Duct joints are not required. Main duct hangers shall be included to ensure conflicts are reduced
   b. Equipment to its overall height, width, and depth based on submitted manufacturer specifications. Equipment access zones will be shown as solids. Access zones for equipment above ceiling will extend below face of ceiling.
   c. Size and thickness of all housekeeping pads
   d. Any piping associated with the mechanical equipment. Pipes shall be modeled to the outside diameter of the pipe.
   e. Pipe insulation shall be modeled to outside diameter. Pipe insulation on a separate drawing layer
   f. All grilles, registers, and diffusers
   g. All fire and smoke dampers and indicate service access requirement (e.g. access panel) if not readily accessible
   h. Identify duct balance dampers and model service access zone requirements. Equipment access zones will be shown as solids.

3D BIM MODEL COORDINATION PROGRAM

Note: The intent of this model is to show the ductwork and piping as accurately as possible to the actual condition at the completion of construction. Specific dimensional locations of these items may not be included in the construction documents.

4. *High and Low Voltage Electrical – Division 26, 27, & 28*
   a. All conduit raceways 1" and larger
   b. All racked (grouped) conduit raceways with 3 or more conduits
   c. All light fixtures located and sized per submitted manufacturer specifications with access space requirements
   d. All power feeds to equipment and switch gear
   e. All junction boxes 4"x4" and larger
   f. All cable tray, associated clearances, and hook locations
   g. Electrical required for HVAC and Plumbing equipment
   h. Hangers and electrical support structures modeled accurately based on approved submittal and to manufacturer specifications.
   i. Modeling switches, outlets, data ports, and similar items where coordination with architectural furniture, fixtures, and equipment or interior elevations is required
   j. Duct banks to actual size, location, and elevation
   k. "No-fly Zones" above panels shall be modeled.
   l. For project with demountable partitions, model in-wall stub ups and electrical zone boxes.

5. *Plumbing/Piping – Division 22*
   a. All plumbing and piping, access zones, and equipment.
   b. Pipe modeled to the outside diameter
   c. Pipe insulation modeled to outside diameter. Pipe insulation shall be modeled on separate layer.
   d. Pipe slope shall be modeled accurately
   e. All plumbing equipment to its overall height, width and depth based on approved submittal.
   f. Pipe hangers / supports modeled accurately based on approved submittal and to manufacture specifications
   g. All valves, service access including chain guides
   h. All drip legs, drain pipes, blow down valves, and cleanouts
   i. All underground piping (if applicable)

6. *Fire Protection Sprinkler and Alarm – Division 21*
   a. All components of fire protection system. This includes all piping, valves, fire pump, and sprinkler heads
   b. Any access zone requirements will be shown as solids
   c. "No-fly Zones" above control panels shall be modeled.

7. *Civil & Site Utilities (if applicable)*
   a. All new underground utilities to include underground electrical, plumbing, and piping. Pipe slope shall be modeled accurately.
   b. Include all underground structures including, but not limited to duct banks, utility tunnels, manholes and utility vaults

8. Special Construction – Division 13 (Swimming Pools or other specialty systems)
   a. All plumbing and piping, access zones, and equipment.

b. Pipe modeled to the outside diameter
c. Pipe insulation modeled to outside diameter. Pipe insulation shall be modeled on separate layer.
d. Pipe slope shall be modeled accurately
e. All plumbing equipment to its overall height, width and depth based on approved submittal.
f. Pipe hangers / supports modeled accurately based on approved submittal and to manufacture specifications
g. All valves, service access including chain guides
h. All drip legs, drainpipes, blow down valves, and cleanouts
i. All underground piping (if applicable)

9. Conveying Systems – Divison 14 *(if applicable)*
   a. All piping including accurate radius or pipe bends and hanger locations
   b. All Ductwork associate with these systems
   c. All equipment including maintenance and access zones
   d. All embeds and attachment locations.

II. CONSTRUCTION COORDINATION

Purpose: The Coordination process helps to identify conflicts between system models to ensure accurate spatial coordination, reduce field re-work, facilitate post-construction access for maintenance, and meet design intent and performance of systems as indicated in the construction documents. The intent of the coordination meetings is to resolve all conflicts prior to fabrication and installation of systems in the shop or field to ensure maximum value is achieved.

A. BIM Coordination

1. Autodesk BIM 360 Glue and Autodesk Navisworks Manage software will both be used to identify conflicts between trades.
2. Subcontractors shall accommodate weekly meetings to resolve model conflicts as necessary to maintain the project schedule.
3. The sequence of 3D coordination may not coincide with the overall construction sequence. In areas of high priority or for long lead items, Contractor may require coordination activities that do not align with the construction schedule.
4. The flow of coordination and schedule will allow floors to be coordinated and signed-off prior to fabrication of MEP equipment.
5. The Contractor will execute clash detection using Autodesk Navisworks Manage and Autodesk BIM 360 Glue. Each clash will be reviewed during the coordination meetings and the responsible party, or parties, will commit to resolving the clash during the meeting. At the end of each meeting, the IM will publish a list of issues to the project Dunn Dashboard that are assigned to the responsible party who is required to resolve the clash. Each item that has been assigned is expected to be resolved prior to the next meeting or within the next (7) days, whichever is earlier. If no solution can be achieved by the parties, the Architect may be engaged, through the Contractor, to help resolve the issue(s). Any required RFI's will be the responsibility of the system owner to create and submit for approval.
6. Shop drawings/submittals for items that will be involved in coordination shall be submitted for review and approved prior to the start of coordination in each area.
7. Each subcontractor shall verify local code clearance requirements related to their respective scopes of work.
8. Models used in coordination are to be purged of all non-essential information. All 2D reference information should be deleted. Only 3D information should remain in the

file. Examples of items that should not be included in posted trade models include: text, leaders, symbols, architectural references, and construction geometry.

9. Model "Sign-off" will be at the discretion of the IM. In general Sign-Off will not occur until all issues that have been assigned are resolved. If design ASI's, RFI's, or bulletins require additional coordination in a signed-off area affected subcontractors will be required to participate in additional coordination meetings in the affected area(s). Items not included in the coordination model will be installed at the subcontractor's own risk. The components installed per the final coordinated model will take precedence over items not included in the Federated model(s) or Signed-off model(s).
10. Components that are installed in conflict with model layout and create obstacles or additional work for other disciplines shall require one of the following: a) removal and reinstallation per the final Federated Model, or b) an adjustment to the subcontract or supplier agreement in order to compensate the affected party or parties, including Contractor's costs to update the construction model accordingly).

B. Coordination Schedule & Meetings

1. A coordination schedule will be produced that includes agreed upon sign-off completion dates for each area of coordination, done in direct correlation with the Contractor's construction schedule and installation of mechanical and electrical systems.
2. The Contractor will establish the schedule for model uploads and coordination meetings. These meetings will re-occur weekly, at a minimum, until all issues are resolved.
3. A representative from each subcontractor involved in the project shall attend each coordination meeting At a minimum the BIM detailer/designer and project manager for each subcontractor must be present at each meeting. This representative should have first-hand knowledge of what has been drawn and be prepared to resolve conflicts based on what is discussed in the coordination meeting.
4. Meetings will be attended by representatives from the design team on an as-needed basis.

C. Equipment Provided by Others

1. Subcontractors with connections to equipment provided by others are required to coordinate layout and access as noted on the submittals and shop drawings or local codes.
2. Where equipment submittals are not available, or equipment is unknown at the time of coordination, subcontractors will work with the Contractor to establish access and installation zones to insert in the coordinated shop drawings.
3. Equipment locations will be coordinated with architectural layout.
4. Equipment requiring individualized detailing will be detailed separately from the coordination drawing and added as a block or access zone. 3D rendering and viewing may be necessary. These individual areas will be reviewed by representatives from the Contractor, the supplier, the Architect, and the Owner, for maintenance, access, and serviceability.

III. BIM COORDINATION SIGN-OFF DRAWINGS FOR SUBMITTALS

A. General Submittal Requirements:

3D BIM MODEL COORDINATION PROGRAM

1. Coordination Models will be submitted for information only. Each subcontractor must submit a separate set of shop drawings for the respective subcontractor's Scope of Work.
2. All coordination sign-off and shop drawings must be submitted per the Specifications. Refer to Division 1 of the Specifications, and all other applicable Specification Sections.
3. Shop drawings shall include dimensioning size of systems, elevation and location from grid.
4. Drawings showing additional detail of the mechanical spaces or congested areas may be required.
5. Shop drawings must be fully coordinated and submitted prior to the installation of any items pertaining to those drawings.
6. Shop drawings will include 2D information such as architectural backgrounds, gridlines, company title block, and drawing number.
7. Drawings indicating structural wall and floor penetrations are also required for review and approval. Provide block wall penetrations for coordination with the masonry subcontractors.

IV. FILE SHARING

The Architect and the Contractor will be the Information Model Manager(s). The Architect will initially utilize their own file sharing site for exchanging information among team members. As design progresses, file exchange will be accomplished through the Contractor's project Dunn Dashboard site and Autodesk BIM 360 Glue per the following:

1. All Contract Documents will be stored on the project Dunn Dashboard / SharePoint site for access by all trades.
2. Every BIM 360 Glue project will include folders for all subcontractors to store BIM models.
3. A separate "Coordination Models" folder will be available for the posting of coordinated BIM models (in Navisworks (NWD) format) in the Glue project for the team to download and review.
4. 2D electronic CAD backgrounds will either be stored in the "BIM Documents" folder on the Contractor's project Dunn Dashboard or the Autodesk BIM 360 Glue project site.

V. AS-BUILT MODEL REQUIREMENTS (IF APPLICABLE)

The Contractor, the Architect, and subcontractors will be responsible for updating the as-built model during the construction phase based on Owner requirements. It is critical that the as-built models are kept updated throughout construction and given to the necessary party at the agreed upon deliverable time as determined by the Owner and/or documented in the record model requirements outlined in the BIM Execution Plan or at the BIM coordination kick-off meeting.

SECTION 00 73 00
SPECIFIC PROJECT REQUIREMENTS
ATTACHMENT C
CONSTRUCTION INDOOR AIR QUALITY

I. GENERAL
   A. RELATED DOCUMENTS
      1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

II. SUMMARY
   A. This section defines the Indoor Air Quality Plan which focuses on providing a clean construction environment in order to produce not only an improved final product but also an improved working environment during construction. Each project will require a tailored IAQ Plan in order to account for any unique construction activities that may necessitate additional IAQ directives.
   B. Section includes requirements for:
      1. Clean-up methods for maintaining indoor air quality.
      2. Use of vacuums.
      3. Cutting.
      4. Ductwork cleanliness guidelines.
      5. Protection of absorptive materials from moisture damage.
      6. Temporary heating and cooling.
      7. Existing facility guidelines.
   C. Related Sections:
      1. Division 01 Section “Temporary Facilities and Controls” for other specific requirements for temporary facilities.
      2. Division 01 Section “Execution” for other requirements for cutting and patching and progress cleaning.
      3. Division 00 Section “Construction Waste Management and Disposal” for other requirements for waste disposal.
      4. [Division 00 Section “Special Project Procedures for Healthcare Facilities” for other requirements in Healthcare and Life Science construction.]

III. SUBMITTALS
   A. Indoor Air Quality (IAQ) Plan – After attending a pre-coordination meeting with the Contractor, the Mechanical Subcontractor with guidance from the Contractor shall submit a project specific construction indoor air quality plan describing proposed usage for existing or new temporary HVAC systems and electrical requirements. Coordinate with Electrical Subcontractor.

IV. PRODUCTS (Not used)

V. EXECUTION/PLAN IMPLEMENTATION
   A. General: The IAQ guidelines outline the basic information necessary to accomplish the required environmental conditions.
   B. Clean-Up Methods: In order for a Subcontractor to maintain the basic required conditions for an acceptable IAQ environment daily clean-up methods must be performed. These include the following steps:
      1. Daily clean-up of all waste products.
      2. Walk-off mats – Often times the most dust and debris comes from outside of the building

during poor weather conditions. Temporary walk-off mats should be used at all entrances. Walk off mats shall be provided by [the Contractor].

3. Vacuums should be readily available to each crew for immediate use. (See “vacuums” below for further information).
4. Additional clean-up during finishing will be required in order to mitigate dust and debris that may affect the end product.
5. Access points into the building will be restricted to a limited number. Similarly the trash routes and toilet facilities route may be restricted to these specific access points and therefore must be taken into consideration during planning.
6. Drywall Subcontractor shall vacuum out all stud tracks and chases before installing sheetrock.
7. Use wax based sweeping compounds (only if allowed by finish flooring manufacturer) to minimize dust.
8. Equipment rooms shall be cleaned regularly.

C. Vacuums: Although vacuums are only a tool for achieving a successful IAQ Plan the availability of these items becomes an important aspect during construction. The guidelines below provide information that must be followed.
   1. Saws, sanders and other construction tools that create dust must be fitted with vacuums during use.
   2. Shop Vacuums must have a working filter system. Any vacuums that do not appear to vacuum or filter the dust as expected may be required to be replaced per the direction of the Contractor.

D. Cutting: Once the building becomes enclosed the cutting methods require specific changes that will influence the flow of construction. Cutting within an enclosed space, especially during finishes, may be done only if necessary. The majority of cutting must be completed outside of the building enclosure and would not require any additional safeguards. Cutting within the structure without the following precautions will not be prohibited.
   1. Wet cutting will be required during the cutting of most products within the building enclosure. This mostly pertains to the cutting of concrete and masonry although some finish products such as solid surfacing and tile work may also require wet cutting.
   2. Cutting of some products such as gypsum board or millwork may need to be performed inside due to weather constraints. These products must utilize saws that can be fitted with vacuums.
   3. Cutting stations may be built to provide an efficient process for a large amount of cutting. These stations may be designated rooms sealed off to contain the dust and debris. A designated cutting room must be accompanied by a permanent vacuum and daily clean-up of this room will be required. A mobile cutting station could be a secondary option for interior cutting. The mobile station concept will allow for a crew to maintain a close proximity to the current work area while still restricting dust and debris.

E. Ductwork Cleanliness Guidelines: Guidelines for ductwork cleanliness shall be as follows (follow other Contract Document requirements if more stringent than requirements listed in this section):
   1. Ductwork Fabrication
      a. Shop or factory fabricated ductwork shall be manufactured in a shop environment with the mill oil film removed. When shop fabricated ductwork and fittings are shipped to the site completely assembled, both ends shall be sealed with an adhered protective covering (hairnets are not acceptable).
      b. Ductwork may be shipped unassembled. This duct shall be kept covered and

cleaned at the site as it is erected.

c. Ductwork and fittings purchased from other fabricators, i.e. spiral, oval, etc., and delivered directly to the jobsite, shall be cleaned and capped and mill oil removed.
d. Duct fabrication labels shall be placed on duct exterior only. No paper identification labels shall be inside the duct.

2. Shipping: All ductwork and accessories shipped from fabrication shop(s) shall be shipped in an enclosed trailer or enclosed truck to protect the ductwork from damage, dirt, and moisture during transit to the jobsite.
3. Storage: Ductwork that is delivered to the site shall be installed as soon as possible. Care shall be taken to schedule only enough material on site for the immediate workload. If ductwork is to be stored on the site, it must be in enclosed vans or inside the building at least 4” above the floor to avoid damage from weather or spills. Openings shall remain sealed until installed.
4. Installation
    a. Duct cleanliness for installed ductwork systems shall be maintained to meet the requirements for fabricated ductwork (see above). The ductwork shall be cleaned as necessary to maintain these conditions.
    b. Cover all ends of installed ductwork at the end of each workday, or when work is suspended for any length of time, i.e. breaks, lunch, etc. Hair nets are not acceptable.
    c. If installed prior to roofing, protect ductwork from water infiltration.
5. Special Systems (Surgery, Pharmacy, Labs etc.): Any special systems, as outlined in the specifications or noted on the drawings, shall be internally cleaned with sterilizing alcohol. All openings shall be kept sealed and not opened for air outlet installation until all room finishes and dust related work is completed. Ductwork and equipment for these systems shall not be utilized for temporary heating and cooling. If conditioning of these spaces is required, temporary units may be necessary. These systems shall not be brought on-line until dust generating activities are complete (as directed by the Contractor).
6. Air Outlets Diffusers and Grilles:
    a. Air outlets shall be installed with filter media or blanked off (as directed by the Contractor).
    b. Return air shall not be activated until all dust generating activities are complete. If return air must be activated prior to completion, upon approval by the Contractor, install filter media on return duct openings.
    c. Equipment
        i. Air Handling Units, including their respective mechanical equipment rooms, and rooftop units are to be inspected for dirt/debris prior to any filter installation/start-up and shall be cleaned as necessary. Use 10% Isopropyl Alcohol-Water solution to wipe down the inside surfaces of the air handlers. Use proper ventilation whenever cleaning with an Isopropyl Alcohol solution.
        ii. All VAV terminal units shall be shipped from the factory and completely sealed and shall not be opened until they are installed and ductwork connected. Also terminal units are to be protected even if installed.

F. Protection of absorptive materials from moisture damage: HVAC Pipe or Ductwork insulation shall be stored 4” off the floor and covered to protect it from moisture and dirt, if necessary. Once installed this is the responsibility of the Subcontractor until the owner has accepted the work.

G. Temporary Heating And Cooling
   1. General: The following is a basic guide for the use of existing or new HVAC equipment to be used for temporary conditioning during construction. Each job is unique as to the type of equipment on site, construction schedule, and construction type. Following a pre-coordination meeting with the Owner, Contractor, and Design Team, the Mechanical Subcontractor in conjunction with the Contractor shall submit their plan for coordination and have it reviewed for approval.
      a. Reference Division 00 and 01 Sections “Temporary Facilities and Controls” for additional requirements.
      b. Proper execution of the temporary HVAC and IAQ program should result in clean ductwork systems at project substantial completion. Should ductwork become contaminated, Subcontractor will be held accountable for measures to test and clean ductwork.
   2. Use of Systems and Equipment
      a. Filtration: Subcontractor shall provide and maintain equal to or greater filtration during temporary conditioning than specified for the final intended use of the system. Utilized rolled media on all filter banks to facilitate increasing the life of the filters during temporary conditioning. Filtration of duct openings, such as return air diffuser and supply diffuser may be required to protect duct work. Prior to starting any duct system, all duct insulation shall be installed. Insure all fire smoke dampers are open (manually, if required).
      b. Return air: If the use of return air duct systems is required prior to the completion of final finishes (in an area served by an AHU) filtration is required at each return grille.
      c. Unit cleaning: At the completion of temporary conditioning, all internal components of the AHU must be cleaned by the Mechanical Subcontractor (i.e. coils, fans, damper, condensate pans, flow stations, humidifiers, etc.). Use 10% Isopropyl Alcohol-Water solution to wipe down the inside surfaces of the air handlers. Use proper ventilation whenever cleaning with an Isopropyl Alcohol solution.
      d. Start-up and testing: Prior to start-up, testing, balancing and commissioning of any supply air/return air system and it’s respective air handling equipment, the Mechanical Subcontractor and Contractor shall review the status areas served by the system. Upon approval, the Subcontractor will commence preparations for system testing. Temporary filter media (installed over the pre-filter banks), pre-filters and final filters shall be installed in the air handling units. The extra filtration should remain in place until the TAB subcontractor is ready to perform performance checks on AHUs. Should any dust making activities occur after this point, the air handling equipment shall be shut down and protected.

SECTION 00 73 16
INSURANCE PROGRAM

DUNN CONTROLLED INSURANCE PROGRAM (DCIP)

Controlled Insurance Program Requirements & Forms for General Liability Only

**NOTE: TRADE PARTNER SHALL NOT INCLUDE COST OF ON-SITE GL INSURANCE IN BID.

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THIS MANUAL IS PART OF YOUR CONTRACT.

Introduction I

Definitions II

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Claim Reporting Form

This document has been prepared to provide general information about the Dunn Controlled Insurance Program and the procedures to be followed by an Enrolled Trade Partner. **This manual is not** a substitute for policies issued, nor is it to be interpreted as altering or changing any of the general or special conditions or other terms of the insurance contract as it pertains to insurance coverage or any other duties or responsibilities of any contractor or Trade Partner(s) enrolled in this program.

What is a Controlled Insurance Program?

The Dunn Controlled Insurance Program (DCIP) is a coordinated master insurance, safety and claim management program for the Contractor and all Enrolled Trade Partners working on the Project.

What coverage will the DCIP provide?

The following coverage is provided by the DCIP for the Contractor and **Enrolled** Trade Partners: onsite General Liability and onsite Excess Liability.

Who is eligible to be enrolled?

Any Trade Partner that is not defined herein as excluded is eligible.

What are an Enrolled Trade Partner's obligations as a participant in the DCIP?

- ✓ **Exclude** onsite General Liability costs from pricing; include all other insurance costs as required by this manual in the price.
- ✓ Complete all enrollment forms prior to starting work. (Section XII)
- ✓ Provide Certificate(s) of Insurance as well as all applicable policy endorsements evidencing all coverage required in this manual to be furnished by Enrolled Trade Partners and not provided under the DCIP. (Sections XII) All certificates of insurance and applicable endorsements evidencing all required insurance shall be tendered to JE Dunn's third party administrator, myCOI. Trade Partners shall register with myCOI through the myCOI registration process. Trade Partner authorizes Contractor and myCOI to contact Trade Partner's insurance agent/broker or other authorized person to obtain certificates of insurance and request, as appropriate, changes to such insurance to meet the requirements herein.
- ✓ Comply with all on-site safety requirements including, but not limited to, the DCIP Project Safety Program. (Section XI and http://sms.jedunn.com/safety_program)
- ✓ Immediately report accidents or occurrences as required in the Claims Procedures. (Section X)

What are an EXCLUDED (Non-enrolled) Trade Partner's obligations?

- ✓ Contracts are to be bid with **all** costs of providing insurance required in this manual included in its overall price for the Work. (Section VII)
- ✓ Provide Certificate(s) of Insurance as well as all applicable policy endorsements evidencing all coverage required in this manual to be furnished by Non-enrolled Trade Partners. (Sections VII and XII) All certificates of insurance and applicable endorsements evidencing all required insurance shall be tendered to JE Dunn's third party administrator, myCOI. Trade Partners shall register with myCOI through the myCOI registration process. Trade Partner authorizes Contractor and myCOI to contact Trade Partner's insurance

agent/broker or other authorized person to obtain certificates of insurance and request, as appropriate, changes to such insurance to meet the requirements herein.

- ✓ Comply with all on-site safety requirements including, but not limited to, the DCIP Project Safety Program. (Section XI and http://sms.jedunn.com/safety_program)
- ✓ Immediately report accidents or occurrences as required in the Claims Procedures. (Section X)

Who is excluded from the DCIP?

Unless allowed by Contractor, the following parties, including their lower tier Trade Partners are excluded from the DCIP:

- ✓ Trade Partners performing hazardous material remediation;
- ✓ Trade Partners performing structural demolition;
- ✓ Trade Partners performing blasting operations;
- ✓ Elevator Trade Partners;
- ✓ Architects, engineers, surveyor, testing laboratories, and their consultants; and
- ✓ Vendors, suppliers, material dealers, haulers and/or independent haulers, and firms whose sole function is to transport, pick up, deliver, or carry materials, supplies, tools, equipment, parts, or other items or persons to or from the Project site.

Contractor reserves its right to exclude any and all Trade Partners and/or lower tier Trade Partners from the DCIP.

Important Facts

- ✓ **Enrollment:** Enrollment in the DCIP by all eligible Trade Partners is mandatory (unless specifically excluded by the Contractor) but not automatic. **Satisfactory completion and submission of enrollment forms is required PRIOR TO STARTING WORK AT THE PROJECT SITE.**
- ✓ **Enrolled Trade Partners:** The DCIP shall apply to the Contractor and eligible Trade Partners who have complied with the insurance requirements and completed the enrollment process. Contractor reserves the right to exclude any Trade Partner from the DCIP.
- ✓ **Excluded Trade Partners/Activities:** See Section II *Definitions* to review the parties and activities excluded from DCIP coverage. The Contractor, at its sole discretion, will determine which Trade Partner(s) of any tier will participate in the DCIP.
- ✓ **Scope of Insurance:** Unless otherwise specifically indicated, the coverage set forth in Section IX *DCIP Insurance to be furnished for Enrolled Trade Partners* will cover only those operations of the enrolled parties performed in connection with the Work on the Project

site. The DCIP shall not apply to the operations of any Trade Partner at their offices, factories, warehouses or otherwise not on the Project site.

- ✓ **Safety:** Strict compliance with Section XI *Project Safety Program*, the Dunn national safety program (at http://sms.jedunn.com/safety_program), and any other safety requirements in the Contract Documents will be required at all times. Failure to comply is a default of the Subcontract and could result in being denied coverage under the DCIP, being denied access to the Project site, or termination of the Subcontract.

- ✓ **If an Enrolled Trade Partner contracts with a lower tier Trade Partner, including contract employee(s) and temporary employment agencies, the Trade Partner is responsible for the following:**

  1. Including this manual and all requirements within it as a part of the Enrolled Trade Partner's lower tier subcontract agreement(s). Ensuring that such lower tier Trade Partners fulfill all obligations as required of you as a Trade Partner under the DCIP.

  2. Notifying the Contractor of all subcontract awards utilizing the Trade Partner Enrollment Application-GL Only Program form. (Section XII *Forms*).

  3. Having the Trade Partner(s) bid **exclude onsite General Liability coverage cost**, but include the costs of providing insurance required in this manual.

     All Enrolled Trade Partners will be required to meet the DCIP requirements. The Contractor has the authority to deny access to the Jobsite for noncompliance of insurance or safety requirements. **TRADE PARTNERS SHALL VERIFY THEIR LOWER TIER TRADE PARTNER(S) HAVE MET THESE REQUIREMENTS PRIOR TO AWARDING WORK, INCLUDING, BUT NOT LIMITED TO, COLLECTION OF ALL REQUIRED CERTIFICATES OF INSURANCE. Upon request, Trade Partner shall provide the Contractor with all certificates of insurance from Trade Partner's lower tier Trade Partners.**

Refer to Section V. Miscellaneous DCIP Requirements for "Other Contractor and Trade Partner Obligations"

Who needs a copy of this manual?

- ✓ Trade Partner's administrative personnel who manage its insurance and/or its insurance agent/broker.
- ✓ Trade Partner's estimators, prior to bidding work on the Project.
- ✓ Trade Partner's safety personnel, who will need to educate its on-site workers with respect to the Project Safety Program requirements.
- ✓ Trade Partner's claims personnel, who will be responsible for turning in claims.
- ✓ Lower-tier Trade Partners.

The following definitions shall apply **only** for the purpose of this Project Insurance Manual.

Architect/Engineer
The firm or team of firms that provide design services, including preparation of the construction documents under a contract with the Owner.

Contractor
J.E. Dunn Construction Company or any subsidiary or affiliate, which has the primary Project contract with the Owner or other entity and which subcontracts some or all work under a Contract between the Contractor and Trade Partners.

Contract/Contract Document(s)
A written agreement between the Contractor or its designee and a Trade Partner.

DCIP
The Dunn Controlled Insurance Program under which certain insurance coverage are provided and paid for by the Contractor.

Designated Representative
A representative approved by the Contractor and its Trade Partner(s) to be readily accessible at all times during working hours for the purpose of reporting claims and completing claim reports.

Enrolled Trade Partner
A Trade Partner that has a contract with the Contractor or one of its Trade Partners for the Project and has been **approved** by the Contractor. Approval requires the Trade Partner to have previously:

1. complied with all insurance requirements, and
2. completed and returned to Contractor the Trade Partner Enrollment Application-GL Only Program.

Excess Liability
Any number of insurance policies that provide additional limits of coverage in excess of the limits provided by the primary policy.

Excluded Parties/Activities
1. Trade Partners performing hazardous material remediation and their lower tier Trade Partners.
2. Trade Partners performing structural demolition and their lower tier Trade Partners.
3. Trade Partners performing blasting operations and their lower tier Trade Partners.
4. Elevator Trade Partners and their lower tier Trade Partners.
5. Architect, engineer, surveyor, or testing laboratory and their sub consultants of any tier.

6. Vendors, suppliers, material dealers, haulers and/or independent haulers, and firms whose sole function is to transport, pick up, deliver, or carry materials, supplies, tools, equipment, parts, or other items or persons to or from the Project site.

Insurer

Commercial General Liability: Liberty Mutual Fire Insurance Co.

Excess Liability: National Fire & Marine Insurance Co.

Excess Liability: Ohio Casualty Insurance Company

Jobsite/Project Site

The location of work or operations performed by the Contractor or Trade Partner at the designated jobsite. Jobsite work also includes areas adjacent to Project site or nearby described tracts of land where incidental operations are performed as specifically indicated in the Contract Documents.

This insurance does not apply to the operations of any Trade Partner(s) of any tier at their offices, factory, warehouse, or yards or otherwise not on the Project site. **The DCIP insurance coverage apply only to work performed at the Jobsite.**

Non-enrolled Trade Partner

Trade Partner excluded from the DCIP and their lower tier Trade Partners.

Owner

Owner as defined in the Contract Documents.

Project

The construction project for which the Contractor has a written agreement with the Owner for the Work.

Trade Partner

Persons or companies providing construction services and/or materials and equipment for the Project under written Contract with Contractor or under contract with a Trade Partner of any tier.

Trade Partner Supervisor

A Trade Partner's superintendent or primary supervisor for the Work on the Project or for a given Project who has the overall responsibility to see that the Work or Project is satisfactorily completed in accordance with the Contract.

Work

The construction and services, including all labor, material, equipment and services to be provided to complete the Trade Partner's obligations under the Contract Documents. Work also includes areas adjacent to the Project site or nearby described tracts of land where incidental operations are performed as specifically indicated in the Contract Documents.

Forms required for enrollment must be received prior to arrival on the Jobsite. (Submit to Contractor within seven (7) days of award of Subcontract, receipt of a Notice to Proceed, or receipt of the Subcontract, whichever is earlier.)

- ❑ Trade Partner Enrollment Application-GL Only Program (Section XII *Forms*).
- ❑ Certificate(s) of Insurance (Section XII *Forms*) must be tendered to myCOI

Loss Control	Eric Zuhlke National Safety Director, JE Dunn Construction Company 1001 Locust Street Kansas City, MO 64106 (816) 292-8740 eric.zuhlke@jedunn.com
Claims Consultant	Holly Wright, Assistant Vice President Lockton Companies, LLC Claims Consultant 444 West 47th Street, Suite 900 Kansas City, Missouri 64112-1906 (816) 960-9429 hwright@lockton.com
DCIP Director and Program Administrator	Beth Brown, Insurance Program Manager JE Dunn Construction Company 1001 Locust Street Kansas City, MO 64106 (816) 292-8732 beth.brown@jedunn.com
Contact for Filing Claims	Beth Brown J. E. Dunn Construction Company 1001 Locust Street Kansas City, MO 64106 (816) 292-8732 claims@jedunn.com
Contact at myCOI	Support Center www.mycoitracking.com support@mycoitracking.com (888) 692-6448 ext 105

Audits
If a Contract provides for audit, due to the GMP nature of the Contract, for change orders, or any other provision, and if during such audit costs are discovered which relate to onsite General Liability coverage, such costs shall be disallowed.

Returning to the Jobsite After Substantial Completion
The DCIP will provide General Liability coverage for up to one year following substantial completion if the Trade Partner is required to return to the site. Such insurance only applies to issues with work performed under its original contract. If Trade Partner returns to the site for any other reason, including maintenance of installed equipment, the DCIP will not be applicable and Trade Partner's own insurance coverage must respond to any occurrence or event.

Assignment and Transfer to Return of Premiums
Enrolled Trade Partners of any tier assign and transfer any and all rights, title, and all interest in any dividends, retrospective adjustments, participation payment and/or return of premiums, which may be payable to the Contractor under the DCIP. This Assignment and Transfer to Return of Premiums is in no way related to the Trade Partner's usual or traditional insurance programs.

Prior to enrollment and commencement of any Work on the Project, Enrolled Trade Partners, at their own expense, will furnish to the Contractor's third party vendor, myCOI certificates of insurance and all applicable endorsements evidencing insurance coverage as follows:

1. **Minimum Coverage and Limits.** Unless higher limits are required in the Contract Documents, Enrolled Trade Partners must procure, carry and maintain policies of insurance meeting the requirements and minimum limits listed below. Where appropriate, the required insurance limits may be provided through a combination of primary and excess/umbrella policies.

   A. **Workers' Compensation and Employer's Liability Insurance.** Enrolled Trade Partners must obtain and maintain Workers' Compensation Insurance to cover the statutory limits and requirements of the Workers' Compensation laws of the state or states in which the Enrolled Trade Partner's Work is performed. Trade Partner's Workers' Compensation Insurance shall include coverage for all proprietors, partners, members and executives. Enrolled Trade Partners must carry this insurance regardless of eligibility for waiver or exemption of coverage under a state law. Trade Partner's Workers' Compensation Insurance shall provide coverage for every tier with whom Trade Partner has a contract to perform Trade Partner's work on the project, including, but not limited to Professional Employee Organizations, Staffing companies or concerns or labor vendor Trade Partners (hereafter collectively "Organizations") where such Organizations are performing any labor or services on the project. Enrolled Trade Partners must also obtain and maintain Employer's Liability insurance, including Occupational Disease coverage, meeting the requirements and written for the following policy limits:

      $500,000 Bodily Injury Each Accident
      $500,000 Each Employee
      $500,000 Aggregate – Policy Limit

      Coverage for Workers' Compensation and Employers Liability shall be written on an NCCI WC 00 00 00 coverage form or its equivalent.

      Such insurance must include "other states" insurance, so as to include all states not named on the declarations page of the insurance policy, except for the monopolistic states.

      Enrolled Trade Partners shall either provide workers' compensation coverage, or require proof of workers' compensation coverage from every person with whom it has a direct contract to perform construction work on the Project. The substance of this clause shall be included in all contracts the Enrolled Trade Partner enters into with lower tier Trade Partners.

   B. **OFFSITE Commercial General Liability Insurance.** Enrolled Trade Partners must obtain and maintain Commercial General Liability Insurance for activities **not on the Jobsite** for the hazards of (i) construction operation, (ii) independent contractors, (iii) products/completed operations, (iv) explosion, collapse and underground (XCU),

(v) broad form property damage, (vi) personal injury, (vii) premises operations, and (viii) broad form contractual liability and must be written for the following policy limits:

$1,000,000 Per Occurrence, Combined Single Limit for Bodily Injury and Property Damage
$1,000,000 Personal & Advertising Injury
$2,000,000 General Aggregate (Per Project)
$2,000,000 Products/Completed Operations Aggregate

Enrolled Trade Partners must continue to maintain or renew annually Commercial General Liability, including products/completed operations, for a minimum of **the statute of repose for the state in which the project is located** from completion of the Enrolled Trade Partners' Work on-site, or as required by the Contract Documents, whichever is longer.

C. **Commercial Automobile Liability Insurance.** Enrolled Trade Partners must obtain and maintain comprehensive automobile insurance covering all owned, non-owned and hired automobiles used in connection with the Enrolled Trade Partner's Work written for the following policy limits:

$1,000,000 Combined Single Limit for Bodily Injury and Property Damage per Accident

D. **Excess/Umbrella Liability.** Enrolled Trade Partners must obtain and maintain Excess Liability coverage on a form following primary policy form (for Offsite General Liability, Automobile Liability and Employers Liability) written for the following policy limits:

$2,000,000 Per Occurrence
$2,000,000 Aggregate Limit

Enrolled Trade Partners must continue to maintain or renew annually Excess/Umbrella Liability for a minimum of **the statute of repose for the state in which the project is located** from completion of Enrolled Trade Partners' Work on-site, or as required by the Contract Documents, whichever is longer.

E. **Design/Professional Liability.** If any design responsibility is included in the Contract, Enrolled Trade Partners, or its designer, must purchase, and maintain or renew annually for a period of **the statute of repose for the state in which the project is located** after the date of Final Completion, insurance covering claims arising out of the performance or furnishing of Design Professional Services and for claims arising out of allegations of errors, omissions or negligent acts in connection with the Subcontract. The policy must be written for the following policy limits:

$1,000,000 Each Claim,
$1,000,000 Annual Aggregate Limit

F. **Commercial Watercraft and/or Aircraft Liability (if applicable).** If watercraft or aircraft are used in connection with the Enrolled Trade Partner's Work, Enrolled Trade

Partners must obtain and maintain Commercial Watercraft and/or Aircraft Liability insurance covering the use of all owned, non-owned, and hired watercraft and/or aircraft written with a combined bodily injury or property damage limit of **$50,000,000**.

G. **Equipment Policy.** Enrolled Trade Partners must provide property coverage for their equipment and tools brought onto the Project site.

2. **Conditions**

A. **Insurance Primary.** Enrolled Trade Partners agree that all of its policies of insurance (including any General Liability and/or Excess/Umbrella Liability covering offsite activities and employees not excluded as set forth herein) are primary, non-contributory with and not in excess of the coverage of the insurance provided hereunder (whether primary, excess, or umbrella) or any other insurance available to the Additional Insured required by contract.

B. **Severability of Interest.** Offsite General Liability, Excess/Umbrella Liability and Pollution Liability, if any, must be written to provide that, inasmuch as this policy is written to cover more than one insured, all terms, conditions, insuring agreements and endorsements, with the exception of limits of liability, must operate in the same manner as if there were a separate policy covering each insured.

C. **Waiver of Subrogation.** All policies of insurance, as allowed by law and excluding Design/Professional Liability insurance, that are in any way related to the Work or services of the Project, including those that are secured and maintained by consultants and lower-tier Trade Partners, must include a provision providing that each party and its insurance carrier waive all rights of recovery under subrogation or otherwise against the Owner, Contractor, Architect (if required in the Contract Documents), enrolled trade partners of any tier, and any other person or entity required by the Contract Documents, and all their assigns, subsidiaries and affiliates.

D. **Additional Insureds.** Trade Partner furnished insurance (except Workers' Compensation Insurance and Professional Liability, if applicable) must include, **Owner; Contractor, Architect (if required in the Contract Documents)**; and any other person or entity required by the Contract Documents, and all their assigns, subsidiaries and affiliates as additional insureds as their respective interest may appear ("Additional Insureds"). Additional Insured status must be provided for ongoing operations and completed operations. Additional Insured endorsements are subject to Contractors review and approval when provided with Certificate of Insurance. Additional Insured endorsements may not contain time limitation less than required by Contract, nor may it alter limit coverage provided to the Additional Insured.

E. **Cancellation Notice.** All insurance certificates and policies shall not be canceled, non-renewed or materially changed without the Trade Partner providing sixty (60) days prior written notice to Contractor.

3. **Lower-Tier Trade Partners' Insurance.** Trade Partner must require all lower-tier Trade Partners providing equipment, materials or services directly to Trade Partner in connection

with the Trade Partner's Work to obtain, maintain and keep in force coverage in accordance with these insurance requirements. Trade Partner must obtain certificates of insurance evidencing such coverage and provide Contractor with such certificates upon request. Trade Partner will not be excused from its obligations to cause such lower-tier Trade Partner to meet the insurance coverage requirements set forth under this section unless Trade Partner obtained in writing from Contractor a waiver, which must be effective only as to such requirements and for such lower-tier Trade Partners specifically identified therein.

Trade Partner shall verify that their lower tier Trade Partners have met the Workers' Compensation insurance requirements, as required by law, including but not limited to collecting all required certificates of insurance.

4. **General Requirements**

A. Insurance certificates and endorsements complying with these requirements must be received by Contractor's third party vendor, myCOI or Trade Partner prior to commencement of Trade Partner's Work on the Project and will be a condition to any payment.

B. All insurance is to be issued by companies acceptable to Contractor but must be provided by companies having at least an A.M. Best rating of A-VI or better and authorized in the state in which the project is located.

C. Contractor reserves the right to require that Trade Partner provide certified copies of any and all insurance policies and endorsements.

D. Certificates of Insurance and policy endorsements are subject to the approval of Contractor. However, any acceptance of a certificate by Contractor does not limit or relieve Trade Partner of its obligations under the Contract or waive Trade Partner's obligation to maintain such insurance.

E. Contractor may take such steps as necessary to assure Trade Partner's compliance with the insurance requirements. In the event Trade Partner fails to obtain and maintain the policies of insurance meeting the requirements and minimum limits identified above, Contractor may obtain and maintain such coverage and recover the cost from Trade Partner.

F. The policies of insurance required above must contain no exclusion for work expressly within Trade Partner's scope of work (e.g., EIFS, asbestos, etc.) unless Trade Partner has a separate policy providing such coverage and provides evidence of such coverage with limits of liability comparable with above stated limits.

G. The required coverage and limits referred to and set forth herein do not affect or limit Trade Partner's liability with respect to its Contract and its performance or the coverage as an Additional Insured.

Non-enrolled Trade Partners and/or suppliers (Excluded Parties) shall not be covered by insurance provided through the DCIP. Instead all Non-enrolled parties in the DCIP shall obtain and maintain all insurance coverage specified below until all of their obligations have been discharged, including any warranty periods under their contract.

1. **Minimum Coverage and Limits.** Unless higher limits are required in the Contract Documents, Non-enrolled Trade Partners must procure, carry and maintain policies of insurance meeting the requirements and minimum limits listed below. Where appropriate, the required insurance limits may be provided through a combination of primary and excess/umbrella policies.

   A. **Workers' Compensation and Employer's Liability Insurance.** Non-enrolled Trade Partners must obtain and maintain Workers' Compensation Insurance to cover the statutory limits and requirements of the Workers' Compensation laws of the state or states in which the Non-enrolled Trade Partner's Work is performed. Trade Partner's Workers' Compensation Insurance shall include coverage for all proprietors, partners, members and executives. Non-Enrolled Trade Partners must carry this insurance regardless of eligibility for waiver or exemption of coverage under a state law. Trade Partner's Workers' Compensation Insurance shall provide coverage for every tier with whom Trade Partner has a contract to perform Trade Partner's work on the project, including, but not limited to Professional Employee Organizations, Staffing companies or concerns or labor vendor Trade Partners (hereafter collectively "Organizations") where such Organizations are performing any labor or services on the project. Non-enrolled Trade Partners must also obtain and maintain Employer's Liability insurance, including Occupational Disease coverage, meeting the requirements and written for the following policy limits:

      $500,000 Bodily Injury Each Accident
      $500,000 Each Employee
      $500,000 Aggregate – Policy Limit

      Coverage for Workers' Compensation and Employers Liability shall be written on an NCCI WC 00 00 00 coverage form or its equivalent.

      Such insurance must include "other states" insurance, so as to include all states not named on the declarations page of the insurance policy, except for the monopolistic states.

      Non-enrolled Trade Partners shall either provide workers' compensation coverage, or require proof of workers' compensation coverage from, every person with whom it has a direct contract to perform construction work on the Project. The substance of this clause shall be included in all contracts Non-enrolled Trade Partners enter into with lower tier Trade Partners.

   B. **Commercial General Liability Insurance.** Non-enrolled Trade Partners must obtain and maintain Commercial General Liability Insurance for the hazards of (i) construction operation, (ii) independent contractors, (iii) products/completed operations, (iv) explosion, collapse and underground (XCU), (v) broad form property damage,

(vi) personal injury, (vii) premises operations, and (viii) broad form contractual liability and must be written for the following policy limits:

$1,000,000 Per Occurrence, Combined Single Limit for Bodily Injury and Property Damage
$1,000,000 Personal & Advertising Injury
$2,000,000 General Aggregate (Per Project)
$2,000,000 Products/Completed Operations Aggregate

Non-enrolled Trade Partners must continue to maintain or renew annually Commercial General Liability, including products/completed operations, for a minimum of **the statute of repose for the state in which the project is located** from completion of Non-enrolled Trade Partners' Work on-site, or as required by the Contract Documents, whichever is longer.

C. **Commercial Automobile Liability Insurance.** Non-enrolled Trade Partners must obtain and maintain comprehensive automobile insurance covering all owned, non-owned and hired automobiles used in connection with the Non-enrolled Trade Partner's Work written for the following policy limits:

$1,000,000 Combined Single Limit for Bodily Injury and Property Damage per Accident

D. **Excess/Umbrella Liability.** Non-enrolled Trade Partners must obtain and maintain Excess Liability coverage on a form following primary policy form (General Liability, Automobile Liability and Employers Liability) written for the following policy limits:

$2,000,000 Per Occurrence
$2,000,000 Aggregate Limit

Non-enrolled Trade Partners must continue to maintain or renew annually Excess/Umbrella Liability for a minimum of **the statute of repose for the state in which the project is located** from completion of Non-enrolled Trade Partners' Work on-site, or as required by the Contract Documents, whichever is longer.

E. **Design/Professional Liability.** If any design responsibility is included in the Contract, Non-enrolled Trade Partners, or their designers, must purchase, and maintain or renew annually for a period of **the statute of repose for the state in which the project is located** after the date of Final Completion, insurance covering claims arising out of the performance or furnishing of Design Professional Services and for claims arising out of allegations of errors, omissions or negligent acts in connection with the Subcontract. The policy must be written for the following policy limits:

$1,000,000 Each Claim,
$1,000,000 Annual Aggregate Limit

F. **Commercial Watercraft and/or Aircraft Liability (if applicable).** If watercraft or aircraft are used in connection with the Non-enrolled Trade Partners' Work, Non-enroll Trade Partners must obtain and maintain Commercial Watercraft and/or Aircraft

Liability insurance covering the use of all owned, non-owned, and hired watercraft and/or aircraft written with a combined bodily injury or property damage limit of **$50,000,000**.

G. **Equipment Policy.** Non-enrolled Trade Partners must provide property coverage for their equipment and tools brought onto the Project site.

H. **Pollution Liability (if applicable to Trade Partner's scope of work).** The Contractor reserves the right to determine, on an individual contract basis, what pollution coverage shall be carried and what limits will be required. At a minimum, Non-enrolled Trade Partners must furnish insurance providing coverage for Pollution Liability in an amount not less than **$2,000,000 per occurrence/$2,000,000 Annual Aggregate**, complying with the requirements of the Contract Documents.

2. **Conditions**

A. **Insurance Primary.** Non-enrolled Trade Partners agree that all of its policies of insurance are primary, non-contributory with and not in excess of Contractor's primary, excess or umbrella insurance or any other insurance available to the Contractor.

B. **Severability of Interest.** General Liability, Excess/Umbrella Liability and Pollution Liability, if any, must be written to provide that, inasmuch as this policy is written to cover more than one insured, all terms, conditions, insuring agreements and endorsements, with the exception of limits of liability, must operate in the same manner as if there were a separate policy covering each insured.

C. **Waiver of Subrogation.** All policies of insurance, as allowed by law and excluding Design/Professional Liability insurance, that are in any way related to the Work or services of the Project, including those that are secured and maintained by consultants and lower-tier Trade Partners, must include a provision providing that each party and its insurance carrier waive all rights of recovery under subrogation or otherwise against the Owner, Contractor, Architect (if required in the Contract Documents), enrolled trade partners of any tier, and any other person or entity required by the Contract Documents, and all their assigns, subsidiaries and affiliates.

D. **Additional Insureds.** Trade Partner furnished insurance (except Workers' Compensation Insurance and Professional Liability, if applicable) must include, **Owner; Contractor; Architect (if required in the Contract Documents);** and any other person or entity required by the Contract Documents, and all their assigns, subsidiaries and affiliates as additional insureds as their respective interest may appear ("Additional Insureds"). Additional Insured status must be provided for ongoing operations and completed operations. Additional Insured endorsements are subject to Contractors review and approval when provided with the Certificate of Insurance. Additional Insured endorsements may not contain time limitation less than required by Contract, nor may they alter/limit coverage provided to the Additional Insured.

E. **Cancellation Notice.** All insurance certificates and policies shall not be canceled, non-renewed or materially changed without the Trade Partner providing sixty (60) days prior written notice to Contractor.

3. **Lower-Tier Trade Partners' Insurance.** Trade Partner must require all lower-tier Trade Partners providing equipment, materials or services directly to Trade Partner in connection with the Trade Partner's Work to obtain, maintain and keep in force coverage in accordance with these insurance requirements. Trade Partner must obtain certificates of insurance evidencing such coverage and provide Contractor with such certificates upon request. Trade Partner will not be excused from its obligations to cause such lower-tier Trade Partner to meet the insurance coverage requirements set forth under this section unless Trade Partner obtained in writing from Contractor a waiver, which must be effective only as to such requirements and for such lower-tier Trade Partners specifically identified therein.

   Trade Partner shall verify that their lower tier Trade Partners have met the Workers' Compensation insurance requirements, as required by law, including but not limited to collecting all required certificates of insurance.

4. **General Requirements**

   A. Insurance certificates and endorsements complying with these requirements must be received by Contractor's third party vendor, myCOI or Trade Partner prior to commencement of Trade Partner's Work on the Project and will be a condition to any payment.

   B. All insurance is to be issued by companies acceptable to Contractor but must be provided by companies having at least an A.M. Best rating of A-VI or better and authorized in the state in which the project is located.

   C. Contractor reserves the right to require that Trade Partner provide certified copies of any and all insurance policies and endorsements.

   D. Certificates of Insurance and policy endorsements are subject to the approval of Contractor. However, any acceptance of a certificate by Contractor does not limit or relieve Trade Partner of its obligations under the Contract or waive Trade Partner's obligation to maintain such insurance.

   E. Contractor may take such steps as necessary to assure Trade Partner's compliance with the insurance requirements. In the event Trade Partner fails to obtain and maintain the policies of insurance meeting the requirements and minimum limits identified above, Contractor may obtain and maintain such coverage and recover the cost from Trade Partner.

   F. The policies of insurance required above must contain no exclusion for work expressly within Trade Partner's scope of work (e.g., EIFS, asbestos, etc.) unless Trade Partner has a separate policy providing such coverage and provides evidence of such coverage with limits of liability comparable with above stated limits.

G. The required coverage and limits referred to and set forth herein do not affect or limit Trade Partner's liability with respect to its Contract and its performance or the coverage as an Additional Insured.

In the event Contractor, for any reason, is unable to provide or, after commencement of Work, elects not to provide or to continue to provide the insurance as specified in Section IX of this Manual then, upon sixty (60) days written notice from Contractor or its designee, the following shall be required of each Enrolled Trade Partner.

The parties previously enrolled or to be enrolled in the DCIP shall obtain replacement insurance with the minimum coverage and limits set forth in Section VII or as otherwise required by Contractor, with insurers acceptable to Contractor. Such insurance shall be obtained before the DCIP coverage terminates, and Trade Partners shall provide Contractor's third party vendor, myCOI with Certificates of Insurance and applicable policy endorsements or certified copies of policies prior to that date. Trade Partners shall also require all lower tier Trade Partners to obtain such insurance. Contractor shall issue the Trade Partner a Change Order which reflects the cost of the additional premiums realized by Trade Partner and its lower tier Trade Partners for such replacement insurance.

Contractor will, at its sole expense, maintain the following types of insurance under the DCIP:

1. Commercial General Liability

Coverage is written on an "occurrence" basis. The policy includes:

- ✓ Premises and Operations coverage
- ✓ Completed Operations coverage based on the relevant state statute of repose, in effect as of the date of project completion.
- ✓ Personal Injury Liability.
- ✓ Contractual coverage for liability assumed under an insured contract as defined by the insurance policy.
- ✓ Broad form property damage.
- ✓ Independent contractors.
- ✓ Explosion, Collapse, Underground (XCU).
- ✓ Employees are insureds under the policy.
- ✓ Separation of insureds, as defined by the standard Insurance Service Office (ISO) policy form.
- ✓ Stop Gap coverage, where applicable.

Projects with a value between $1M and $15M

Coverage is provided with combined limits of $3,000,000 per occurrence and $12,000,000 General Aggregate and $12,000,000 Completed Operations. The limits of liability apply for all projects enrolled in the DCIP and are shared by Contractor and all Enrolled Trade Partners. General Aggregate limits shall be re-instated annually.

Projects with a value exceeding $15M

Coverage is provided with combined limits of $3,000,000 per occurrence, $6,000,000 General Aggregate, and $6,000,000 Completed Operations. The limits of liability are shared by Contractor and all Enrolled Trade Partners. Aggregates are per project. General Aggregate limits shall be re-instated annually.

Other Notes

The policy will be primary for claims arising from Work under contract at the Jobsite and noncontributory with any other insurance carried by the Trade Partner for work performed at the Jobsite.

Specific exclusions:

1. Engineers and Architects Professional Liability **exclusion (CG2280)**
2. Absolute Pollution **exclusion**
3. Asbestos **exclusion**

4. Fungus/mold **exclusion**

Refer to policy for additional terms, exclusions, and conditions. Policy is available from the DCIP Administrator upon request.

2. Excess Liability

Coverage varies depending on project value. The policy includes:

Projects with a value between $1M and $15M

Excess: Coverage is provided with combined limits of $53,000,000 per occurrence and $53,000,000 General Aggregate and $53,000,000 Completed Operations. The limits of liability apply for all projects enrolled in the DCIP and are shared by Contractor and all Enrolled Trade Partners. General Aggregate limits shall be re-instated annually.

Projects with a value exceeding $15M

Excess: Coverage is provided with combined limits of $53,000,000 per occurrence, $53,000,000 General Aggregate, and $53,000,000 Completed Operations. The limits of liability are shared by Contractor and all Enrolled Trade Partners. Aggregates are per project. General Aggregate limits shall be re-instated annually.

Umbrella/Excess shall not provide excess coverage for Employer's Liability, Automobile Liability or any type of Liability coverage other than onsite General Liability coverage.

Refer to policy for additional terms, exclusions, and conditions. (Available from DCIP Administrator upon request)

Deductible

Trade Partners are responsible for payment of a deductible up to $2,500.00 per occurrence for general liability property damage claims.

DCIP Insurance Carriers

General Liability: Liberty Mutual Fire Insurance Co.

Excess Liability: National Fire & Marine Insurance Co.

Excess Liability: Ohio Casualty Insurance Co.

Providing the insurance described in this Section IX shall in no way relieve, limit, or be construed to relieve or limit the Trade Partners of any responsibility or obligation whatsoever otherwise imposed by their Contract or by law.

Any type of insurance or increase of limits not described above, which the Trade Partner requires for its own protection or on account of statute, shall be its own responsibility and at its own expense.

1. **General Liability Claims – Enrolled Trade Partners:** It is the responsibility of all Enrolled Trade Partners to notify the Contractor of all claims **within 24 hours** of the occurrence by following the procedures below. **Failure to timely notify Contractor of any and all claims could be grounds for denial of coverage.**
   A. Immediately notify the Contractor's superintendent or project manager of any property damage or injury involving a third party.
   B. An Enrolled Trade Partner that wishes to submit a claim involving personal injury or property damage directly shall complete a Claims Reporting Form (Section XII *Forms*) and email it to claims@jedunn.com **within 24 hours** of the occurrence.
   C. In the event the Trade Partner is served with a summons or other legal notice involving a claim of personal injury or property damage to a third party related to the Project, a copy of the summons, complaint, or other legal notice shall be forwarded **within 24 hours** of its receipt to the Contractor's project manager with a PDF copy to claims@jedunn.com. If not previously submitted, a Claim Reporting Form should also be completed, as described above. **Delay in reporting a summons or other legal notice could result in a default judgment against the Trade Partner.**
   D. Trade Partners shall assist in completing any paperwork (including the Claim Reporting Form) and undertaking any investigation of the injury or property damage. Trade Partner should be prepared to provide:
      - Date, time, and location of the occurrence
      - Name, address and phone number of the injured person(s) and/or owner(s) of the damaged property
      - Description of the damaged property, if any
      - Name, address and phone number of witness(es)
2. **General Liability Claims – Non-enrolled Trade Partners:** Non-enrolled Trade Partners shall immediately report any property damage or injury involving a third party directly to their own insurance carrier/broker by following its usual procedures. Non-enrolled Trade Partners shall likewise notify Contractor's Jobsite superintendent or project manager of any such occurrence and shall, on request, confirm to Contractor that satisfactory reporting to the insurance carrier has occurred.
3. Enrolled Trade Partners, on a quarterly basis, may request a reporting of the participant's respective claims details and loss information. An Enrolled Trade Partner may submit their request by email to claims@jedunn.com.

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1.1 **Definitions**

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1.0 INTRODUCTION & POLICY STATEMENT

The project team is totally committed to providing each worker a safe and healthful workplace. To accomplish this objective, it is necessary that an effective and understandable safety and health policy be defined and enforced consistent with nationally recognized standards.

The success of the safety program requires the combined efforts of the Contractor, Trade Partners and all employees. It is very important that the team addresses this objective in order to maintain the safest and most successful projects in the construction industry.

The Contractor's national Safety and Health Program can be found at http://sms.jedunn.com/safety_program. Adherence to the Safety and Health Program **is a requirement** for all of the Contractor's partners on all of its projects.

Additionally, the Contractor and DCIP Administrator have prepared DCIP-specific Project Safety Requirements. The Safety and Health Program, as well as the DCIP-specific Project Safety Requirements, are binding terms for all Enrolled and Non-enrolled Trade Partners. **Together, these two items comprise the core of the *Project Safety Program* for any DCIP Project.**

It is a requirement of all Trade Partners that the Safety and Health Program, including the DCIP-specific Project Safety Requirements and any contract provisions necessary to operate and enforce the Project Safety Program successfully, be included in all Project contracts and subcontracts to the lowest tier. The Contractor shall be responsible for the proper execution of the project loss control program.

It is not the intention of the Project Safety Program to be all-inclusive. It is however, an attempt to provide the Trade Partners and their employees with basic safety and health requirements as well as provide requirements that may be in addition to Occupational Safety and Health Act (OSHA) regulations. It is incumbent on all parties to follow the best and highest safety practices in all aspects of their activities at all times.

In the event of a conflict and/or ambiguity between various statutes, law, regulations or standards and this Project Safety Program, interpretation by the Contractor's Safety Manager will be final.

1.1 Definitions

The definitions set forth in Section II of this Manual shall apply to the Project Safety Program. The following additional definitions also apply:

A. Project Safety Program: shall be comprised of the Contractor's national Safety and Health Program, the DCIP-specific Project Safety Requirements, OSHA regulations, other applicable regulations (federal, state or local), and any contract provisions necessary to operate and enforce the program.

B. Contractor's Representative: the person(s) designated by the Contractor as having the responsibility to monitor the Project Safety Program.

C. Trade Partner Safety Representative: the individual on the payroll for each Trade Partner responsible for monitoring compliance with the Project Safety Program and the respective Trade Partner's own safety plan.

2.0 RESPONSIBILITIES

Trade Partners shall comply with the Project Safety Program. Each Trade Partner shall retain primary responsibility for its work and its employees. Each Trade Partner shall also be responsible for its Trade Partners' compliance with the Project Safety Program.

All Trade Partners shall require their employees to complete a project safety orientation prior to being able to enter the work area. Training shall include introduction to the Project Safety Program, as well as proper use of personal protective equipment requirements such as hard hats, safety glasses, ear protection, foot protection, and clothing requirements. It is the Trade Partner's responsibility to provide task specific safety training for their workers.

Trade Partner's personnel, employees, suppliers, consultants, agents and visitors shall, when upon or about the Project site, observe and comply with the strictest provisions of all federal, state, or local safety, fire, and environmental laws, rules, and regulations and as otherwise prescribed by the Project Safety Program or any other legal requirements.

Failure to comply with the Project Safety Program will be considered as noncompliance with the Contract and may result in remedial action, including withholding of payment of any sums due and/or termination of the Trade Partner and from the site.

Trade Partners shall take all necessary precautions to protect the public from any hazards involving safety and health arising from their scope of work. All construction activities shall be isolated from the public to the greatest extent possible.

Each Trade Partner will be responsible for the payment of all fines and/or claims for damages levied against them for safety or environmental violations or deficiencies related to the conduct of their employees or Work.

The Contractor and/or the Contractor's Representative shall have the authority to stop work in progress when necessary to enforce mandatory safety requirements. The Contractor shall not be liable for any damages experienced by Trade Partner due to stoppage. No part of the time lost due to any such stop work order shall be made the subject of a claim for extension of time or increased costs by Trade Partner.

Each Trade Partner is required to name an individual on its payroll as Trade Partner Safety Representative. Each Trade Partner Safety Representative shall have the experience, ability, and authority to act on the respective Trade Partner's behalf in matters of safety on the Project. This individual shall, at a minimum, be certified in the OSHA 30 Hour hazard recognition course. The Trade Partner Safety Representatives shall be allowed adequate time to conduct all necessary safety activities required by the Project Safety Program for the successful operation of the Safety Program. Costs of Trade Partner's participation in the activities are the responsibility of the Trade Partner. Selection of these representatives is subject to approval by Contractor and must be submitted in a timely manner for review. Each Trade Partner Safety Representative will become a member of the Project Safety

Committee(s) and will be expected to attend all scheduled committee meetings called by the Contractor. The Trade Partner agrees to make their designated Trade Partner Safety Representative available for additional specialized safety training over and above the normal duties stated above, as deemed appropriate by the Contractor.

If at any time the Trade Partner is performing Work under more than one contract at the Project site or intends to or does have fifty (50) or more employees on site ("High employment"), such Trade Partner will have a full-time safety representative with no other craft or supervisory duties assigned. This requirement is to ensure the safety of its operations and to protect all of the stakeholders during the period of such High employment. If the Trade Partner does not comply with this requirement, Contractor may elect to supplement this personnel resource at Trade Partner's expense and without authorization from Trade Partner.

Trade Partners shall provide the following items before commencement of work and throughout the life of the project:

- A copy of the company's corporate safety and health program/manual;
- A copy of the Trade Partner's project specific safety plan;
- A list of Competent person(s) designated by the Trade Partner;
- Job hazard analysis that defines the scope of work, activities and risks involved with the scope of work, and the methods Trade Partner will use to mitigate and eliminate such risks;
- Daily JSA's;
- Written Hazard Communication Program;
- Written Exposure Control Plan for Silica, when applicable;
- A list of chemicals used on the Jobsite in the performance of the Work;
- Copies of Safety Data Sheets (SDS's) for each chemical used on the Jobsite;
- Documentation of required training for Project employees as it applies to their Work;
- Inspection process and periodic inspections of the work area;
- Copies of incident investigations (within 24 hours of occurrence) for any incident or near miss occurring on the Project site;
- Incident log of occupational injuries and illnesses that occur on the Jobsite, including a 300 log, when requested;
- Records of the disposal of chemicals/materials or any other hazardous wastes used on the Jobsite in the performance of the Contract; and
- Proof of compliance with storm water discharge environmental regulations. (The Contractor, and its option, may choose to create and maintain this documentation for the Trade Partners.)

- Leading and Lagging Safety Indicators reported electronically through the Dunn Dashboard (weekly requirement).

Employees are prohibited from use and possession of alcoholic beverages, drugs (other than prescription), carrying weapons or ammunition onto the Project site, or using or carrying weapons while performing Work on the Project or attending Project sponsored activities. Trade Partner further agrees to comply with any postings or notices placed on site by the Contractor's representative regarding safety, security, or weapons.

The Contractor has adopted a policy of a drug free work site on the project, which may include, but is not limited to pre-work, just cause, and post-accident drug screening.

All Trade Partner employees must provide to the Contractor's Representative satisfactory evidence of a negative 9-panel drug screening at the designated clinic before being allowed access to the Project. If the Trade Partner utilizes a clinic other than the one designated by the Contractor, the testing methods, procedures, protocols and reporting procedures utilized will be subject to approval by the Program Safety Manager. It shall be provided no later than at the time of safety orientation of the employee and prior to commencing work. Employee drug screening shall have been performed within the 45 days immediately prior to the employee's start date on the Project. Worker participation in a bona fide substance abuse program may, subject to approval by the Contractor and Insurer, meet the requirement for pre-work drug testing. Whenever the employee sustains a job-related injury and the company concludes that drugs or alcohol, if used, may have contributed to the incident causing the injury requiring professional medical treatment a drug and alcohol test is necessary. Such tests will be administrated at the time an injured worker receives medical treatment resulting from the incident. Testing is not limited to the injured employee but may be required of all or any person(s) involved in the incident as required by the Project Safety Manager. The cost of the testing for any reason is the responsibility of the Trade Partner. The Contractor, at its discretion, may require a "for cause" drug test.

All unauthorized personnel (those individuals on site without an identification badge/sticker) wishing to enter the construction site must have the permission of the Contractor or its designee. Permission will only be given upon verification that the unauthorized personnel will be accompanied at all times by an authorized employee.

Trade Partner's personnel, employees, suppliers, consultants, agents and visitors shall, observe and comply with the strictest provisions of all federal, state, local safety regulations, fire regulations, and environmental laws as prescribed by the Project Safety Program or any other legal requirements.

The Trade Partner shall provide each worker on the Jobsite the proper tools and equipment to safely perform his/her job. Additionally, all PPE shall supplied, inspected and maintained by the Trade Partner at Trade Partner's expense. Special note; Contractor has adopted a glove wearing policy and culture on this project. Trade Partners must provide adequate hand protection (i.e. gloves) for each employee which is based on task specific risks. At a minimum, gloves must meet a cut level protection equivalent to an Ansi 2 / EN 3 and as it pertains to a scale of (1-5).

In addition to task specific safety training, each Trade Partner shall conduct weekly toolbox talks. Safety meetings shall be documented by subject, date and time, and attendees' names. A copy of the toolbox talk must be transmitted weekly to the Contractor's Representative. If the limited number of employees of the Trade Partner on site makes such a talk impractical, such employees shall attend the weekly toolbox talk scheduled by the Contractor. Contractor reserves the right to call additional safety meetings when conditions warrant. These safety meetings will be at the expense of Trade Partner. Training materials are available through trade associations, insurance companies, and the Program Safety Manager.

Any Trade Partner that is involved in "high hazard" work will be required to provide notification of the start of such activity to the Project Safety Manager prior to the commencement of such activity. Such scopes and activities include, but are not limited to: critical lifts with cranes, hot work, trenching and excavations, work at heights, steel erection, precast erection, work in close proximity to overhead power lines, utility tie-ins, pneumatic tests and confined space entry work.

The Contractor may request the removal from the project of any Trade Partner or Sub-Trade Partner personnel, management, supervision, or craft for noncompliance with the Project Safety Plan or non-correction of hazards. This request for removal may also apply to any individual who, in the opinion of the Contractor and the Contractor's Representative, exhibits an unsafe behavior attitude. The Contractor and/or the Contractor's Representative shall not be liable for any damages experienced by any Trade Partner due to removal of Trade Partner's personnel, management, supervision, or craft from the Site.

Trade Partners are required to discipline employees who violate established rules and regulations of the Project. The Trade Partner's disciplinary procedures will meet or exceed those provided for in the Project Safety Program.

Trade Partners, without exception, must comply with Contractor's Safety and Health policies as outlined in the Safety and Health Manual. With special emphasis and actions placed on fall protection, falling object/overhead protection, floor holes and openings, mobile elevated work platforms, precast erection and steel erection.

3.0 HAZARD NOTIFICATION

Imminent danger situations brought to the attention of the Contractor shall be corrected by the responsible Trade Partner ("creating employer") immediately. Other unsafe conditions will be conveyed via written and/or oral notifications from Contractor. The Trade Partner, within one (1) working day of issuance, must correct the hazards and/or unsafe acts. This may include removal of defective equipment from the Project. Upon expiration of the one working day (24-hour period), the Contractor may stop work until the hazard is sufficiently abated to Contractor's satisfaction. Lost time, lost productivity, or other expenses as a result of a safety hazard and/or safety violation will be at the sole cost of the Trade Partner.

Trade Partners encountering safety hazards beyond their control or expertise to correct are encouraged to notify the Contractor of their concerns. Failure on the part of the Contractor to observe or deter unsafe work practices shall in no way relieve any Trade Partner of its

safety responsibilities. Lack of cooperation in complying with these requirements will be considered non-compliance with the Contract and may result in a remedial action including, but not limited to, withholding of payments due the Trade Partner or correction of the hazard by the Contractor with the cost deducted from the Trade Partner's Contract balance.

A. Trade Partner Enrollment Application – GL Only Program

B. Certificate of Insurance – Enrolled Trade Partners

C. Certificate of Insurance – Non-enrolled Trade Partners

D. Claim Reporting Form

Dunn Controlled Insurance Program
Trade Partner Enrollment Application – GL Only Program

Prime Trade Partner

Project Name: _____

Company Name: _____

Enrollment Contact: _____ _____ _____
Name *Phone* *Fax*
E-mail Address: _____

Company Address: _____
Street Address
_____ _____ _____
City *State* *Zip*

Federal Employer's Identification Number (FEIN): _____ Contract Value: _____

Scope of Work: _____ Estimated Start Date: _____

Who holds your contract (J.E. Dunn or other)? Specify: _____

If you are subcontracting any of your work, please fill out the following. Please keep in mind YOU will be held responsible per contract for notification of any and all additional subcontracts issued under YOU. This means at any tiers.

LOWER TIER TRADE PARTNER ONE:

Company Name: _____

Enrollment Contact: _____ _____ _____
Name *Phone* *Fax*
E-mail Address: _____

Company Address: _____
Street Address
_____ _____ _____
City *State* *Zip*

Federal Employer's Identification Number (FEIN): _____ Contract Value: _____

Scope of Work: _____ Estimated Start Date: _____

LOWER TIER TRADE PARTNER TWO:

Company Name: _____

Enrollment Contact: _____ _____ _____
Name *Phone* *Fax*
E-mail Address: _____

Company Address: _____
Street Address
_____ _____ _____
City *State* *Zip*

Federal Employer's Identification Number (FEIN): _____ Contract Value: _____

Scope of Work: _____ Estimated Start Date: _____

If you have additional lower tier Trade Partners, please submit them on an attached sheet with this application.

Signature of Company Officer: _____ Date: _____

Please return this completed form to the Project Management staff for this project.

SAMPLE-DCIP GL ENROLLED TRADE PARTNERS
CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
Broker Name	PHONE (A/C, No, Ext):	FAX (A/C, No):
(Name, Address)	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A: Insurance Company	
INSURED	INSURER B:	
Trade Partners	INSURER C:	
	INSURER D:	
(Name, Address)	INSURER E:	
	INSURER F:	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$1,000,000
	CLAIMS-MADE / X OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
	X For Offsite Coverage						MED EXP (Any one person)	$
	X Outside the DCIP						PERSONAL & ADV INJURY	$1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$2,000,000
	POLICY / X PROJECT / LOC						PRODUCTS - COMP/OP AGG	$2,000,000
	OTHER:							$
A	AUTOMOBILE LIABILITY						COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$
	OWNED AUTOS ONLY / SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	X HIRED AUTOS ONLY / X NONOWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
A	UMBRELLA LIAB / X OCCUR						EACH OCCURRENCE	$2,000,000
	EXCESS LIAB / CLAIMS-MADE						AGGREGATE	$2,000,000
	DED / RETENTION $							$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY Y/N: N. ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below	N/A					X PER STATUTE / OTH-ER	
							E.L. EACH ACCIDENT	$500,000
							E.L. DISEASE - EA EMPLOYEE	$500,000
							E.L. DISEASE - POLICY LIMIT	$500,000
								$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Dunn Project Number_____-[Dunn Project Name]

Workers' Compensation, General Liability, Automobile Liability & Excess Liability Contain a waiver of subrogation where allowed by law.

Option I - For General Liability & Excess Liability on-going and completed operations and Auto Liability policies, blanket Additional Insured endorsement provides additional insured status as required by written contract.

Option II - For General Liability & Excess Liability on-going and completed operations and Auto Liability policies, additional insured status is provided for [insert list of Additional Insureds]

CERTIFICATE HOLDER

JE Dunn Construction Company

1001 Locust Street

Kansas City, MO 64106

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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SAMPLE-DCIP GL NON-ENROLLED TRADE PARTNERS CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER	CONTACT NAME:	
Broker Name	PHONE (A/C, No, Ext):	FAX (A/C, No):
(Name, Address)	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	NAIC #
	INSURER A: Insurance Company	
INSURED	INSURER B:	
Trade Partners	INSURER C:	
	INSURER D:	
(Name, Address)	INSURER E:	
	INSURER F:	

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	X COMMERCIAL GENERAL LIABILITY						EACH OCCURRENCE	$1,000,000
	[ ] CLAIMS-MADE [X] OCCUR						DAMAGE TO RENTED PREMISES (Ea occurrence)	$
	[ ] _____						MED EXP (Any one person)	$
	[ ] _____						PERSONAL & ADV INJURY	$1,000,000
	GEN'L AGGREGATE LIMIT APPLIES PER:						GENERAL AGGREGATE	$2,000,000
	[ ] POLICY [X] PROJECT [ ] LOC						PRODUCTS - COMP/OP AGG	$2,000,000
	[ ] OTHER:							$
A	**AUTOMOBILE LIABILITY**						COMBINED SINGLE LIMIT (Ea accident)	$1,000,000
	X ANY AUTO						BODILY INJURY (Per person)	$
	[ ] OWNED AUTOS ONLY [ ] SCHEDULED AUTOS						BODILY INJURY (Per accident)	$
	X HIRED AUTOS ONLY X NONOWNED AUTOS ONLY						PROPERTY DAMAGE (Per accident)	$
								$
A	[ ] **UMBRELLA LIAB** X OCCUR						EACH OCCURRENCE	$2,000,000
	[ ] **EXCESS LIAB** [ ] CLAIMS-MADE						AGGREGATE	$2,000,000
	[ ] DED [ ] RETENTION $							$
A	**WORKERS COMPENSATION AND EMPLOYERS' LIABILITY** Y/N						X PER STATUTE [ ] OTH-ER	
	ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? N	N/A					E.L. EACH ACCIDENT	$500,000
	(Mandatory in NH)						E.L. DISEASE - EA EMPLOYEE	$500,000
	If yes, describe under DESCRIPTION OF OPERATIONS below						E.L. DISEASE - POLICY LIMIT	$500,000
								$

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

Dunn Project Number_____-[Dunn Project Name]

Workers' Compensation, General Liability, Automobile Liability & Excess Liability Contain a waiver of subrogation where allowed by law.

Option I - For General Liability & Excess Liability on-going and completed operations and Auto Liability policies, blanket Additional Insured endorsement provides additional insured status as required by written contract.

Option II - For General Liability & Excess Liability on-going and completed operations and Auto Liability policies, additional insured status is provided for [insert list of Additional Insureds]

CERTIFICATE HOLDER

JE Dunn Construction Company

1001 Locust Street

Kansas City, MO 64106

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

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CLAIM REPORTING FORM

(Use for all claims <u>except</u> Work Comp and Auto)

Project Name: _____ JE Dunn Project #: _____ Project Start Date: _____

Project Address: _____ City: _____ State/Zip: _____

Supervisor (Name and Phone #) _____

Date of Incident: _____ Time of Incident: _____

Brief Description of Incident: (Describe events, conditions, or action taken. Give **facts** only.)

_____

_____

_____

_____

_____

List of person(s) involved or witness to the incident:

Name	Company	Phone #	Claimant (C), Employee (E), Witness (W) or Other (O)

Person completing the form:

Name (print)	Signature	Company/Employer	Phone #	Date of Report

For Internal Use Only: ☐ "Notice only"

Coverage ☐ GL ☐ BR ☐ Other: _____

GL Program ☐ Traditional ☐ DCIP Dunn I Dunn II Dunn III Dunn IV 1-15 Over 15

Office Code: _____ Project Code: _____ Contractor Code: _____

Please email this completed form **within 24 hours** of the incident to claims@jedunn.com or fax to 816-581-3353.

SECTION 00 73 36
EQUAL OPPORTUNITY

GENERAL: Subcontractors and its sub-subcontractors and suppliers shall not discriminate against any employee or applicant for employment because of race, color, religion, sex or national origin. The Subcontractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Subcontractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

PARTICIPATION: Subcontractors and its sub-subcontractors and suppliers shall use reasonably diligent efforts to seek and provide for minority business enterprise ("MBE") and women business enterprise ("WBE") participation in all construction contracts relating to this project.

All Subcontractors are strongly encouraged to utilize (Minority Owned Enterprises and Women Owned Enterprises) subcontractors and material suppliers. Subcontractors may be asked to demonstrate what efforts were taken to obtain MBE/WBE participation. This will include, but is not limited to, invitation to bid, advertisements in local papers, phone call log, etc.

SECTION 00 73 43
PREVAILING WAGE REQUIREMENTS

Subcontractors and their sub-subcontractors shall pay their workmen not less than the prevailing hourly wage for workmen required to perform the Work of their Subcontract as established by the Division of Labor Standards, State of Missouri, applicable to the location and Work to be performed on the Project. Subcontractors shall maintain payroll records substantiating compliance with the payment of the applicable prevailing wage including, but not limited to, certified payrolls and, if requested, provide copies to the Contractor or Owner of such records.

Missouri
Division of Labor Standards
WAGE AND HOUR SECTION

MICHAEL L. PARSON, Governor

Annual Wage Order No. 26

Section 048
JACKSON COUNTY

In accordance with Section 290.262 RSMo 2000, within thirty (30) days after a certified copy of this Annual Wage Order has been filed with the Secretary of State as indicated below, any person who may be affected by this Annual Wage Order may object by filing an objection in triplicate with the Labor and Industrial Relations Commission, P.O. Box 599, Jefferson City, MO 65102-0599. Such objections must set forth in writing the specific grounds of objection. Each objection shall certify that a copy has been furnished to the Division of Labor Standards, P.O. Box 449, Jefferson City, MO 65102-0449 pursuant to 8 CSR 20-5.010(1). A certified copy of the Annual Wage Order has been filed with the Secretary of State of Missouri.

Original Signed by
Taylor Burks, Director
Division of Labor Standards

Filed With Secretary of State: **March 8, 2019**

Last Date Objections May Be Filed: **April 8, 2019**

Prepared by Missouri Department of Labor and Industrial Relations

OCCUPATIONAL TITLE	** Date of Increase	Basic Hourly Rates
Asbestos Worker		$64.53
Boilermaker		$67.29
Bricklayer		$55.57
Carpenter		$55.90
Lather		
Linoleum Layer		
Millwright		
Pile Driver		
Cement Mason		$50.61
Plasterer		
Communications Technician		$57.27
Electrician (Inside Wireman)		$61.61
Electrician Outside Lineman		$65.19
Lineman Operator		
Lineman - Tree Trimmer		
Groundman		
Groundman - Tree Trimmer		
Elevator Constructor		$32.01*
Glazier		$53.47
Ironworker		**$62.72**
Laborer		$44.64
General Laborer		
First Semi-Skilled		
Second Semi-Skilled		
Mason		$50.06
Marble Mason		
Marble Finisher		
Terrazzo Worker		
Terrazzo Finisher		
Tile Setter		
Tile Finisher		
Operating Engineer		$56.40
Group I		
Group II		
Group III		
Group III-A		
Group IV		
Group V		
Painter		$50.36
Plumber		**$67.77**
Pipe Fitter		
Roofer		$51.99
Sheet Metal Worker		$65.32
Sprinkler Fitter		$32.01*
Truck Driver		$46.29
Truck Control Service Driver		
Group I		
Group II		
Group III		
Group IV		

*The Division of Labor Standards received less than 1,000 reportable hours as required by RSMo 290.257.4(b). Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center, in accordance with RSMo 290.257.2.

Heavy Construction Rates for
JACKSON County

Section 048

OCCUPATIONAL TITLE	** Date of Increase	Basic Hourly Rates
Carpenter		$57.32
Millwright		
Pile Driver		
Electrician (Outside Lineman)		$65.19
Lineman Operator		
Lineman - Tree Trimmer		
Groundman		
Groundman - Tree Trimmer		
Laborer		$46.40
General Laborer		
Skilled Laborer		
Operating Engineer		$54.73
Group I		
Group II		
Group III		
Group IV		
Truck Driver		$46.19
Truck Control Service Driver		
Group I		
Group II		
Group III		
Group IV		

Use Heavy Construction Rates on Highway and Heavy construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(3).

Use Building Construction Rates on Building construction in accordance with the classifications of construction work established in 8 CSR 30-3.040(2).

If a worker is performing work on a heavy construction project within an occupational title that is not listed on the Heavy Construction Rate Sheet, use the rate for that occupational title as shown on the Building Construction Rate Sheet.

*The Division of Labor Standards received less than 1,000 reportable hours as required by RSMo 290.257.4(b). Public works contracting minimum wage is established for this occupational title using data provided by Missouri Economic Research and Information Center, in accordance with RSMo 290.257.2.

OVERTIME
and
HOLIDAYS

OVERTIME

For all work performed on a Sunday or a holiday, not less than twice (2x) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work.

For all overtime work performed, not less than one and one-half (1½) the prevailing hourly rate of wages for work of a similar character in the locality in which the work is performed or the public works contracting minimum wage, whichever is applicable, shall be paid to all workers employed by or on behalf of any public body engaged in the construction of public works, exclusive of maintenance work or contractual obligation. For purposes of this subdivision, **"overtime work"** shall include work that exceeds ten hours in one day and work in excess of forty hours in one calendar week; and

A thirty-minute lunch period on each calendar day shall be allowed for each worker on a public works project, provided that such time shall not be considered as time worked.

HOLIDAYS

January first;
The last Monday in May;
July fourth;
The first Monday in September;
November eleventh;
The fourth Thursday in November; and
December twenty-fifth;

If any holiday falls on a Sunday, the following Monday shall be considered a holiday.

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Phased construction.
4. Purchase contracts.
5. Owner-furnished products.
6. Contractor-furnished, Owner-installed products.
7. Access to site.
8. Coordination with occupants.
9. Work restrictions.
10. Specification and Drawing conventions.
11. Boundaries and benchmarks
12. Unanticipated conditions
13. Asbestos
14. Superintendent
15. Locations and inferences
16. Minimum requirements and standards
17. Warranties.

B. Related Requirements:

1. See Section 007300 Specific Project Requirements, and Division 0.

1.3 PROJECT INFORMATION

A. Project Identification: Mid Continent Public Library: Work Package 10 Colbern Road Branch Library.

1. Project Location: 1000 NE Colbern Rd, Lee's Summit, MO 64086.

B. Owner and Consultants: see Project Directory Section 000002, at front of Project Manual.

C. Web-Based Project Software: Project software administered by Construction Manager will be used for purposes of managing communication and documents during the construction stage.

1. See Division 0, and Section 007300 Specific Project Requirements

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. Demolition of the entire existing building, modifications and expansion of the existing parking, modified utility connections, new storm water detention, and construction of a new 33,527 S.F. library.
2. Existing interior LED light fixtures are to be salvaged and returned to the owner.

B. Type of Contract:

1. Project will be constructed under a single prime contract between JE Dunn and MCPL.

1.5 PHASED CONSTRUCTION

A. See Construction Managers schedule.

1.6 PURCHASE CONTRACTS

A. General: Owner has negotiated Purchase contracts with suppliers of material and equipment to be incorporated into the Work. Owner will assign these Purchase contracts to Contractor. Include costs for purchasing, receiving, handling, storage if required, and installation of material and equipment in the Contract Sum unless otherwise indicated.

1. Construction Manager's responsibilities are same as if CM had negotiated Purchase contracts, including responsibility to renegotiate purchase and to execute final purchasing agreements.
2. See Construction Manager’s schedule, and descriptions for Purchase contracts.

1.7 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products and making building services connections.

B. Owner-Furnished Products:

1. AV equipment, security equipment, and furniture.

2. Exterior site furniture; to be installed by Contractor.

1.8 CONTRACTOR-FURNISHED, OWNER-INSTALLED PRODUCTS

A. Contractor shall furnish products indicated. The Work includes unloading, handling, storing, and protecting Contractor-furnished products as directed and turning them over to Owner at Project closeout.

B. Contractor-Furnished, Owner-Installed Products:

1. None.

1.9 ACCESS TO SITE

A. See Division 0.

1.10 COORDINATION WITH OCCUPANTS

A. Refer to Division 0 and to Construction Manager's schedule for project closure schedule. Coordinate with owner regarding the schedule for closing the existing building and removing all owner items prior to demolition.

B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.

1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.11 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: refer to Construction Manager's requirements and schedules..

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Refer to Construction Manager's requirements and schedules.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Refer to Construction Manager's requirements and schedules.

E. Nonsmoking Building: Smoking is not permitted within the building or on the Owners property.

F. Controlled Substances, Smoking & Alcohol Policy: Smoking or use of tobacco products will not be allowed in any of the buildings or any areas on site except as may be designated as a specific smoking area.

1. Contractor may designate a specific smoking area away from the building subject to approval by Owner and provide for disposal of smoking or tobacco residues. ONLY AS APPROVED BY OWNER.
2. Alcoholic products will not be allowed on site any time.
3. Controlled Substances will not be allowed on site any time.

G. Employee Identification: Provide identification tags for CM and Subcontractor personnel working on Project site. Require personnel to use identification tags at all times.

H. Employee Screening: Comply with Owner's requirements regarding current criminal background screening of CM and Subcontractor personnel prior to working on the Project site. Results shall be made available to Owner.

1. All Contractors and personnel working on site shall have had a criminal background screening available to Owner.
2. Maintain list of approved screened personnel with Owner's representative.

1.12 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

D. Conflicts and Precedence:
1. Discrepancies and Omissions. If CM or Subcontractor is in doubt as to the true meaning of any part of the proposed Contract Documents, or finds discrepancies in, or omissions from, any part of the proposed Contract Documents, he must submit to the Architect a request for interpretation before proceeding with the work.
2. Discrepancies, conflicts, ambiguities, and errors which may have more than one interpretation require that the Architect make the interpretation per General Conditions of the Contract. Per Contract, the default position shall be the more restrictive and/or more costly interpretation, unless a formal interpretation is rendered by the Architect, by addendum, or in writing, per Contract, if occurrence is after bidding.

3. Contractor is not at liberty to assume that a discrepancy or conflict thereby voids or omits any item entirely from the Contract.
4. Drawings are not set up specifically according to trade and each Contractor and Sub-Contractor or trade is required to review all the drawings as a whole and provide any misc. items, materials, work etc required to complete the work as shown on all the documents for the project to provide a complete and operational system. This requirement applies to all trades. Structural, Civil, Mechanical, Electrical and Plumbing requirements and related work are indicated throughout the set of drawings and may or may not, all be shown on the specific trade drawings and all drawings shall be coordinated and reviewed by the specific trades for overall scope of work.

1.13 BOUNDARIES AND BENCHMARKS

A. Contractor shall employ a professional Civil Engineer or Land Surveyor registered in the State of Missouri, and approved by the Architect, to confirm or define site boundaries and for layout of building lines. Erect substantial benchmarks and preserve them throughout the work.

1.14 UNANTICIPATED CONDITIONS

A. If in the course of work the CM or Subcontractor anticipates and/or discovers conditions and/or materials which are beyond the scope of this contract, and/or which may be deemed unreasonably hazardous, and/or uncovers materials which are legally defined as hazardous, the Contractor is to stop work in the area affected, immediately inform the Architect, and do not proceed until resolved in writing from the Architect.

B. The Contractor shall make every reasonable effort to inspect for unanticipated conditions, and to anticipate such conditions by prudent project planning and coordination.

C. Contractor shall review geo-technical report included in this Project Manual for existing conditions of site soils and types of soils or conditions that may be encountered at the Project site.

1.15 ASBESTOES

A. No products shall be installed in this project, which contain asbestos in any of its various forms. If so requested by the owner, the Contractor shall submit to the Owner upon completion of the project certification in writing that no products contain asbestos. If any supplier or subcontractor has knowledge or access to knowledge that any specified product herein contains asbestos, they shall immediately inform the Construction Manager and the Architect prior to submission of bids.

1.16 SUPERINTENDENT

A. As provided for in the Construction Manager's prime contract with Owner.

1.17 LOCATIONS AND INTERFERENCES

A. Locations of equipment and other work is indicated diagrammatically by drawings. Determine exact locations on job, subject to structural conditions, work of other Contractors, access requirements of installation and maintenance and to approval of A/E. Provide necessary material and labor as needed to coordinate with other work and as needed for complete operational system, and other components of which not all may be exactly shown on the drawings, but required for a complete system.

1. It is the intent of these documents to provide a weathertight facility. Contractor shall provide all necessary materials and labor to complete the work whether or not specifically noted on the documents. Contractor shall caulk, seal, enclose and otherwise make weathertight the building whether or not specifically noted on the documents.

B. Study and become familiar with contract drawings of other trades and in particular the general construction plans and details to obtain necessary information for figuring installation. Cooperate with other workmen and install work to avoid interference with their work. Minor deviations, not affecting design characteristics, performance or space limitations may be permitted if reviewed and approved by A/E prior to installation.

C. Installation of any pipe, apparatus, appliance or other item which interferes with proper placement of other work as indicated on drawings, specified, or required, shall be removed, relocated and reconnected, without cause for change in the contract amount. Coordination of trades is the responsibility of the Construction Manager. See General Conditions for additional coordination responsibilities.

D. Drawings are not be scaled. Dimensional data shall be obtained from written information only. Verify all dimensions before proceeding, any dimensional deviation from that shown on drawings, which may affect intent of design or proper incorporation of elements shall be brought to Architect’s attention promptly and resolution obtained before proceeding. Dimensions indicated in contract documents are from face of stud to face of stud, face of existing structure, or finish, face of concrete or block, or structural line, except as noted otherwise. Dimensions of existing structure, or conditions, etc. are plus or minus and should be field verified prior to commencement of work and Architect notified of any discrepancies.

1.18 MINIMUM REQUIREMENTS AND STANDARDS

A. It is the intent of this Contract that a completed and fully operational product be delivered by the Construction Manager as required by the General Conditions. It is the intent of the documents for all indicated equipment and components to be powered, connected, attached, supported, piped, wired, and otherwise functional as necessary to meet manufacturer's recommended installation requirements, and industry standards. The documents are not intended to necessarily show detailed fabrication and installation instructions, nor to show every distinct part and component and their exact location

B. Minimum Standards: Where supportive details and components are not specifically indicated, but required for a complete and proper installation, the Contractor shall refer to the manufacturer's recommendations and installation instructions, and to industry standards for installation of the component or system. See Section 014200 Reference Standards and Definitions.

1.19 WARRANTIES

A. Construction Manager shall provide a one year unlimited warranty against defects in workmanship and materials, as well as minor adjustments to components of the work, in addition to product warranties provided by manufacturers of individual components. The contractor's warranty shall include labor and material and other incidental costs as necessary to correct any defects. All warranties shall commence at date of Substantial Completion. (See Supplemental General Conditions also).

1.20 MISCELLANEOUS PROVISIONS

A. As provided for in the Construction Manager's prime contract with Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions made prior to and after award of Contract.

B. Related Requirements:
1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.
2. Divisions 02 through 49 Sections for specific requirements and limitations for substitutions.

C. Standards: Refer to Section "Definitions and Standards" for applicability of industry standards to products specified.

D. Procedural requirements governing the Contractor's selection of products and product options are included under Section "Materials and Equipment."

1.3 DEFINITIONS

A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.

B. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

C. The following are not considered substitutions:

1. Revisions to the Contract Documents requested by the Owner or Architect.
2. Specified options of products and construction methods included in the Construction Documents.

1.4 PRE-BID SUBSTITUTIONS

A. The naming of specified items on the drawings or in the specifications means that such named items are specifically desired by the Architect and/or Owner. If the words "or acceptable equal" or "or approved equal" follows such named items, substitution requests may be submitted. REQUESTS FOR SUBSTITUTIONS MUST BE RECEIVED BY ARCHITECT NOT LATER THAN TEN (10) BUSINESS DAYS PRIOR TO BID OPENING.

B. No substitutions will be considered after receipt of bids unless conditions outlined in Part 2.1 are met as determined by the Architect. Any substitutions considered per Part 2.1 shall be subject to Architect and Owner's approval.

C. Substitution Request Forms: Requests must be submitted on copies of the enclosed form and must name the exact item proposed with complete information filled out and back-up data attached as specified on that form. Use separate Substitution Request Form for each item. Submit substitution request form and back-up data combined into one Portable Data Format (PDF) file through Submittal Exchange. File shall be named with specification section number first, followed by a brief description of the item submitted for review, (i.e 095113 Acoustical Ceiling Panels.)

1. Requests showing only brand name or manufacturer, or otherwise incomplete, will not be reviewed. Submit samples if requested.
2. Submit physical samples as directed by A/E, if requested.

D. Samples of proposed substitution and of specified products shall be submitted for comparison and review by Architect.

E. The Architect is the sole judge as to the equality of proposed substitutions. ONLY WRITTEN ACCEPTANCES WILL BE HELD VALID BY THE ARCHITECT.

F. If any substitution will affect a correlated function, adjacent construction, or the work of other trades or contractors, the necessary changes and modifications to the affected work will be considered as part of the substitution, to be accomplished without additional cost to the Owner, if and when accepted.

G. The Architect will review substitution requests within ten (10) days prior to the Bid Opening data.. The A/E is not obligated or required to review any and all substitution requests. The Architect is not obligated to inform bidders of incomplete and non-accepted requests.

H. Acceptance of substitutions will be indicated in writing by addendum.

I. Under no circumstances shall be Architect's acceptance of any such substitution relieve the Contractor from any terms and conditions of the Contract Documents, including timely, full and proper performance of the work.

1.5 SUBMITTALS

A. Substitution Request Submittals: Requests for substitution may be considered after commencement of the Work subject to conditions listed under Part 2.1. Requests received more than 30 days after commencement of the Work may be considered or rejected at the discretion of the Architect.

1. Submit three copies of each request for consideration. Submit requests on form in accordance with procedures required for Change Orders

2. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
3. Substitution Request Form: Use facsimile of form provided in Project Manual.
4. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

    a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.
    b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
    c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
    d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    e. Samples, where applicable or requested.
    f. Certificates and qualification data, where applicable or requested.
    g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
    h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
    i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
    j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
    k. Cost information, including a proposal of change, if any, in the Contract Sum.
    l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
    m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

5. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within **seven** days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within **15** days of receipt of request, or **seven** days of receipt of additional information or documentation, whichever is later.

    a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
    b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.6 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.7 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.8 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. The request is directly related to an "or equal" clause or similar language in the Contract Documents.
c. The specified product or method of construction cannot be provided within the Contract Time.
d. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.
e. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.
f. Substitution request is fully documented and properly submitted.
g. Requested substitution will not adversely affect Contractor's construction schedule.
h. Requested substitution has received necessary approvals of authorities having jurisdiction.
i. Requested substitution is compatible with other portions of the Work.
j. Requested substitution has been coordinated with other portions of the Work.
k. Requested substitution provides specified warranty.
l. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed unless otherwise indicated.

C. The Contractor's submittal and Architect's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

WORK PACKAGE 10
COLBERN ROAD BRANCH
MID CONTINENT PUBLIC LIBRARY

SUBSTITUTION REQUEST FORM

SPECIFIED ITEM:_____ **SPEC SECTION**:_____

PROPOSED SUBSTITUTE:_____

SUBMITTED BY:

Firm: _____ Date: _____

Address:_____

Name: _____ Signature:_____

Phone No. _____ Fax No._____ Email: _____

Attach complete description, designation, catalog or model number, Spec Data Sheet and other Technical Data and samples, including Laboratory Tests if Applicable.

Why is substitution being submitted? [ ] Pre-Bid Substitution [ ]Specified Product not available (explain)_____
[ ] Cost Savings to Owner [ ] Other (explain)_____

Fill in blanks below:

1. Will substitution affect dimension indicated on drawings? _____
2. Will substitution affect wiring, piping, ductwork, etc., indicated on drawings? _____
   _____
3. What effect will substitution have on other trades? _____
   _____
4. Differences between proposed substitution and specified item? _____
   _____
5. Any and all impacts on costs, design modifications, additional architectural and engineering services, material and labor changes, schedule changes, and other unanticipated consequences, resulting from this substitution in lieu of the specified item, shall be the full responsibility of the contractor and his subcontractors and supplier.
6. Manufacturer's warranties of the specified items and proposed items are: [ ] same [ ] different, *explain:*
   _____
7. Why Specified Product /Material cannot be provided._____
   _____

REVIEW COMMENTS:

[ ] **No Exception taken to Submitted Manufacturer**
Manufacturer only is accepted due to time limitations for full review of product, or because no specific product data is submitted, or other unspecified reasons. Contractor must still bear full responsibility for compliance with contract requirements.

[ ] **No Exception taken to Specific Products**

[ ] **Exceptions Noted**
See attached copy or notes on product literature

[ ] **Not Accepted**

[ ] **Received too Late** **[ ] Incomplete Submission**

By:_____ Date:_____

Remarks:_____

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Requirements:

1. Section 012500 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.

1.3 MINOR CHANGES IN THE WORK

A. Architect will issue through Construction Manager supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710 "Architects Supplemental Instructions".

1.4 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Construction Manager will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.

1. Work Change Proposal Requests issued by Construction Manager are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 14 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.

    a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.

d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
e. Quotation Form: Use form in same format as sample included at the end of this section or as acceptable to Architect.

B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Construction Manager.

1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision including number of hours and hourly rate, directly attributable to the change.
5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.
7. Proposal Request Form: Use cost breakdown in format acceptable to Architect. Sample copy is included in the Project Manual at the end of this section.

1.5 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Change Proposal Request, Construction Manager will issue a Change Order for signatures of Owner and Contractor on AIA Document G701CMa.

B. Submit an itemized list of all material and labor in each proposal for change items as shown by example of attached sample itemized proposal (included at the end of this section).

C. Deductive Change Orders shall include percentages for overhead and profit.

1.6 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: Construction Manager may issue a Construction Change Directive on AIA Document G714CMa. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Architect may issue a Construction Change Directive when the Owner and Contractor are not in total agreement on the terms of a Change Order Proposal Request

2. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.7 MAXIMUM ALLOWANCE FOR OVERHEAD, PROFIT & LABOR BURDEN

A. Labor costs per hour shall be included with labor burden identified, which shall not be less than the prevailing wage rate, or actual labor rate, etc. Identify any labor burden costs over and above the prevailing wage rate. Labor burden costs shall not include overhead and profit charges as identified below. In no case shall labor burden costs exceed 15% of the wage rate.

1. Reference to wage rates is intended to include prevailing wage rates plus any additional fringe benefits that are part of the wage determination. The maximum Labor Burden of 15% is any additional labor mark ups over and above wage rates plus fringe benefits.

B. The overhead and profit charge by the Contractor and all subcontractors shall be considered to include, but is not limited to: job site office expense, incidental job burdens, truck expense including mileage, small hand tools, project supervision including field supervision, company benefits and general office overhead and preparation of additional pricing submittals for the proposed work. Percentages for overhead and profit charged for Change Orders shall be negotiable and may vary according to the nature, extent and complexity of the work involved. Percentage mark ups provided herein are intended to include the costs associated with all delay, disruption, extended job site presence and general office overhead resulting from the changed work.

C. Contractor shall submit with schedule of values, a proposed hourly labor rate schedule for changes to the work for all major trades that includes prevailing wage rate, labor burden as described above. This labor rate once approved by the Architect and Owner will be the basis for the maximum hourly labor rate on any future changes to the work.

D. The maximum Overhead and Profit shall be as follows:

1. For the Contractor, for work performed by the Contractors' own forces, 10% of the cost, including bond.
2. For the Contractor, for work performed by Subcontractors, 10% of amount due the subcontractor.
3. For each Subcontractor or Sub-Subcontractor, a maximum of 10% over direct cost from the supplier for materials.
4. For each Subcontractor, for work by his sub-subcontractor, 10% of the amount due the sub-subcontractor.
5. Overhead and Profit shall be shown separately for each subcontractor and the Contractor.

E. On proposals covering both increases and decreases in the amount of this contract, the application of overhead and profit shall be on the net change in the cost of the work. Proposals must show items to be deleted, if any, and the cost of the change shall be the result of the net difference to the base contract. Proposals are not to be determined by a re-bid of the entire scope of work except where changes significantly alter the entire scope of a particular trade.

F. The percentages for overhead and profit credit to the Owner on Change Orders that are solely decreases in the quantity of work or materials shall be no less than 10% but may be negotiated and may vary according to the nature, extent and complexity of the work involved, subject to approval of the Owner and Architect.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - SAMPLE FORM

SAMPLE PRICING SHEET

Project: Boiler Room Repairs for ABC Company
Location: Springfield, Missouri Date: March 11, 2017
Labor Rate: $27.00 Estimator: Jane Doe

Units	Units	Unit Measure	Material per Unit	Man Hours per Unit	Total Man Hours	Material Total
6" Tee	1	each	$45.00	2.000	2.0	45.00
less 6" ell	1	each	$30.00	0.000	0.0	30.00
6" sch 40 pipe	15	feet	10.43	.253	3.8	156.45
6" cap	1	each	11.00	1.500	1.5	11.00
6" hanger	1	each	12.00	.400	0.4	12.00
4" saddle weld	1	each	0.00	1.200	1.2	0.00
4" sch 40	18	feet	4,44	.183	3.3	79.92
4" ell	3	each	13.39	2.000	6.0	40.17
4" hanger	3	each	8.00	.300	0.9	24.00
4" weld	1	each	3.00	1.000	1.0	3.00
1-1/2" cond sch 80	21	feet	1.63	.080	1.7	34.23
1-1/2" ell	3	each	4.00	.400	1.2	12.00
1-1/2" tee	1	each	5.00	.600	0.6	5.00
1-1/2" weld	1	each	3.00	.400	0.4	3.00
3/4" F & T trap	1	each	73.00	.500	0.5	73.00
3/4" strainer	1	each	12.00	.500	0.5	12.00
3/4" XH nipples	4	each	7.70	.100	0.4	30.80
3/4" unions	2	each	3.18	.300	0.6	6.36
3/4" cap	1	each	.65	.100	0.1	.65
3/4" pipe sch 80	10	feet	.72	.040	0.4	7.20
3/4" tee	1	each	1.50	.300	0.3	1.50
3/4" ell	3	each	.95	.200	0.6	2.85
3/4" hanger	2	each	2.50	.200	0.4	5.00
SUBTOTAL					28.4	618.47
SALES TAX	(if applicable)			6.125%		37.88
LABOR		28.4	MH	$27.00		765.96
SUBTOTAL						$1,422.31

10% OVERHEAD AND PROFIT	142.23
TOTAL	$1,564.54

END OF SECTION 012600

SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Requirements:
   1. Section 012600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

   1. Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:
      a. Application for Payment forms with continuation sheet.
      b. Submittal schedule.
      c. Items required to be indicated as separate activities in Contractor's construction schedule.
   2. Submit the schedule of values to Architect through Construction Manager at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
   3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
   4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values coordinated with each element.
   5. Subschedules for Separate Design Contracts: Where the Owner has retained design professionals under separate contracts who will each provide certification of payment requests, provide subschedules showing values coordinated with the scope of each design services contract, as described in Section 011000 "Summary."

B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

    a. Project name and location.
    b. Name of Architect.
    c. Architect's Project number.
    d. Contractor's name and address.
    e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Arrange the schedule of values in tabular form, with separate columns to indicate the following for each item listed:

    a. Related Specification Section or Division.
    b. Description of the Work.
    c. Name of subcontractor.
    d. Name of manufacturer or fabricator.
    e. Name of supplier.
    f. Change Orders (numbers) that affect value.
    g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent. Round dollar amounts to whole dollars, with total equal to Contract Sum.

        1) Labor.
        2) Materials.
        3) Equipment.

4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of **five** percent of the Contract Sum.
    a. Include separate line items under Contractor and principal subcontracts for project closeout requirements.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

    a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

7. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
8. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate Owner payments or deposits, if any, and balance to be paid by Contractor.
9. Overhead Costs: Include total cost and proportionate share of general overhead and profit for each line item.

10. Overhead Costs: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
11. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
12. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.5 APPLICATIONS FOR PAYMENT

A. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

B. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

1. Other Application for Payment forms proposed by the Contractor shall be acceptable to Construction Manager and Owner. Submit forms for approval with initial submittal of schedule of values.

C. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration
5. Include certified payroll and certification of compliance with all applicable rules and regulations for prevailing wage rates.

D. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Payment for stored materials off site, is generally not allowed, and is strictly at Owner's option, and if allowed, is subject to compliance with Owner's specific requirements for right of entry confirmation and certification of Owner as additional insured.
2. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment for stored materials and Right of Entry letter authorizing Owner to enter properly to verify stored materials or take possession of materials in case of default of subcontractor.
3. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.

4. Provide summary documentation for stored materials indicating the following:

    a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
5. Comply with any other requirements designated by the Owner.

E. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Construction Manager by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
1. Submit one copy of payroll on approved forms and certification of compliance with all applicable rules and regulations.
2. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.

1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
2. When an application shows completion of an item, submit conditional final or full waivers.
3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
5. Products list (preliminary if not final).
6. Schedule of unit prices.
7. Submittal schedule (preliminary if not final).
8. List of Contractor's staff assignments.
9. List of Contractor's principal consultants, suppliers and fabricators.
10. Copies of building permits.
11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
12. Initial progress report.
13. Report of preconstruction conference.
14. Certificates of insurance and insurance policies.
15. Performance and payment bonds.

16. Data needed to acquire Owner's insurance.

H. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
3. See Section 017700 "Closeout Procedures" for limitations on number of on site reviews for completion and related pay applications.

I. Administrative Actions and submittals that shall proceed or coincide with this application include:
1. Warranties (guarantees) and maintenance agreements.
2. Maintenance instructions.
3. Application for reduction of retainage.
4. Advice on transference of insurance coverage.
5. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion.

J. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Assurance that all work that has not been completed and accepted, will be completed without delay. Final payment will not be made until all work has been completed and accepted.
3. Transmittal of required Project construction records to Owner.
4. Removal of temporary facilities and services.
5. Removal of surplus materials, rubbish and similar elements.
6. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
7. Updated final statement, accounting for final changes to the Contract Sum.
8. AIA Document G706 "Contractor's Affidavit of Payment of Debts and Claims."
9. AIA Document G706A "Contractor's Affidavit of Release of Liens."
10. AIA Document G707 "Consent of Surety to Final Payment."
11. Evidence that claims have been settled.
12. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
13. Final liquidated damages settlement statement.
14. See Section 017700 "Closeout Procedures" for limitations on number of on site reviews for completion and related pay applications.
15. See Supplemental General Conditions and Section 017700 for additional limitations to pay applications and release of retainage.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.
3. Final completion construction photographs.

B. Related Requirements:

1. Section 017700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.
2. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.
3. Section 024119 "Selective Demolition" for photographic documentation before selective demolition operations commence.
4. Section 311000 "Site Clearing" for photographic documentation before site clearing operations commence.

1.3 INFORMATIONAL SUBMITTALS

A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.

B. Digital Photographs: Submit image files within three days of taking photographs.

1. Submit photos on CD-ROM or thumb-drive. Include copy of key plan indicating each photograph's location and direction.
2. Identification: Provide the following information with each image description in web-based project software site:

a. Name of Project.
b. Name of Architect and Construction Manager.
c. Name of Contractor.
d. Date photograph was taken.
e. Description of location, vantage point, and direction.
f. Unique sequential identifier keyed to accompanying key plan.

1.4 FORMATS AND MEDIA

A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels. Use flash in low light levels or backlit conditions.

B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full high-definition mode. Provide supplemental lighting in low light levels or backlit conditions.

C. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

D. Metadata: Record accurate date and time from camera.

E. File Names: Name media files with date and Project area and sequential numbering suffix.

1.5 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs with maximum depth of field and in focus.

1. Maintain key plan with each set of construction photographs that identifies each photographic location.

B. Preconstruction Photographs: Before commencement of demolition, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Construction Manager.

1. Take 20 photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.
2. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

C. Periodic Construction Photographs: Take 20 photographs monthly coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

D. Final Completion Construction Photographs: Take 20 photographs after date of Substantial Completion for submission as Project Record Documents. Construction Manager will inform photographer of desired vantage points.

E. Additional Photographs: Architect or Construction Manager may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum or in the allowance for construction photographs.

1. Three days' notice will be given, where feasible.
2. In emergency situations, take additional photographs within 24 hours of request.
3. Circumstances that could require additional photographs include, but are not limited to, the following:

a. Special events planned at Project site.

b. Immediate follow-up when on-site events result in construction damage or losses.
c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
d. Substantial Completion of a major phase or component of the Work.
e. Extra record photographs at time of final acceptance.
f. Owner's request for special publicity photographs.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013233

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Submittal schedule requirements.
2. Administrative and procedural requirements for submittals.

B. Related Requirements:

1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
2. Section 013233 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and final completion construction photographs.
3. Section 014000 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
4. Section 017700 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
5. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
6. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
7. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's and Construction Manager's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's and Construction Manager's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL SCHEDULE

A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and Construction Manager and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal Category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's and Construction Manager's final release or approval.
    g. Scheduled dates for purchasing.
    h. Scheduled date of fabrication.
    i. Scheduled dates for installation.
    j. Activity or event number.

1.5 SUBMITTAL FORMATS

A. Submittal Information: Include the following information in each submittal:

1. Project name.
2. Date.
3. Name of Architect.
4. Name of Construction Manager.
5. Name of Contractor.
6. Name of firm or entity that prepared submittal.
7. Names of subcontractor, manufacturer, and supplier.
8. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier; and alphanumeric suffix for resubmittals.
9. Category and type of submittal.
10. Submittal purpose and description.
11. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
12. Drawing number and detail references, as appropriate.

13. Indication of full or partial submittal.
14. Location(s) where product is to be installed, as appropriate.
15. Other necessary identification.
16. Remarks.
17. Signature of transmitter.

B. Options: Identify options requiring selection by Architect.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Architect and Construction Manager on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. PDF Submittals: Prepare submittals as PDF package, incorporating complete information into each PDF file. Name PDF file with submittal number.

E. Submittals for Web-Based Project Software: Prepare submittals as PDF files, or other format indicated by Project software website.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Web-Based Project Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections so processing will not be delayed because of need to review submittals concurrently for coordination.

    a. Architect and Construction Manager reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Construction Manager's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 3 weeks for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Construction Manager will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 2 weeks for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 3 weeks for initial review of each submittal.
5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 3 weeks for review of each submittal. Submittal will be returned to Construction Manager, through Architect, before being returned to Contractor.
6. The Architect will make every effort to expedite reviews and will return submittals as soon as reasonably possible. However, the Contractor shall not base construction schedules upon anything less than a 3 week submittal review period.
7. Special conferences can be arranged upon request in order to expedite a submittal due to circumstances beyond control of the Contractor, and when agreed to by the Architect as reasonable and necessary.

D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's and Construction Manager's action stamp.

E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's and Construction Manager's action stamp.

1.7 SUBMITTAL REQUIREMENTS

A. Contractor's Stamp: All shop drawings and submittals shall bear the Construction Manager’s review stamp, dated and initialed, before being submitted to the Architect.
1. Any shop drawing submittal without Construction Manager’s review stamp will be returned to the Contractor for review and re-submittal.
2. DO NOT submit shop drawings and submittals stamped "FOR REVIEW ONLY" or "NOT FOR CONSTRUCTION", or similar notations which imply a second review is required.
3. Architect's review and stamp is only for documents which are to be used in the field for construction. "Review only" sets require a second submittal and complete re-review. Second reviews of this nature will be back charged to the Contractor.

B. Product Data: Collect information into a single submittal for each element of construction, system and type of product or equipment. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information

1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable.
3. Include the following information, as applicable:

    a. Manufacturer's catalog cuts.
    b. Manufacturer's product specifications.
    c. Standard color charts.
    d. Statement of compliance with specified referenced standards.
    e. Testing by recognized testing agency.
    f. Application of testing agency labels and seals.
    g. Notation of coordination requirements.
    h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:

    a. Wiring diagrams that show factory-installed wiring.
    b. Printed performance curves.
    c. Operational range diagrams.
    d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before Shop Drawings, and before or concurrent with Samples.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Standard information prepared without specific reference to the Project is not considered Shop Drawings. Shop drawings marked "Not for Construction" or "For Approval Only" or other disclaimer type marks or notations by the supplier, subcontractor, manufacturers or contractor shall be rejected and returned for re-submittal.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:

    a. Identification of products.
    b. Schedules.
    c. Manufacturer's printed recommendations
    d. Compliance with specified standards.
    e. Installation drawings, setting diagrams & templates
    f. Notation of coordination requirements.
    g. Notation of dimensions established by field measurement.
    h. Relationship and attachment to adjoining construction clearly indicated.
    i. Seal and signature of professional engineer if specified.
    j. Construction Manager’s review stamp with initials and date of review

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other materials.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Permanently attach label on unexposed side of Samples that includes the following:

a. Project name and submittal number.
b. Generic description of Sample.
c. Product name and name of manufacturer.
d. Sample source.
e. Number and title of applicable Specification Section.
f. Specification paragraph number and generic name of each item.

3. Web-Based Project Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect, through Construction Manager, will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit **three** sets of Samples. Architect and Construction Manager will retain **two** Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.

        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
        2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least **three sets** of paired units that show approximate limits of variations.

7. Color Submittals: Submit all interior products requiring a color selection as a group, at one time. Colors must be coordinated as a single package and requires Architects and Owner’s review and approval. Missing submittals may be cause for delay in approval of all color selections:

    a. No extension of contract time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance to permit processing.
    b. Typical minimum interior color package submittal:
        1) All flooring goods, wall base, and accessories.

2) Paint materials
3) Ceiling materials
4) Wall Coverings
5) Toilet Partitions
6) Wood finish products
7) Laminates
8) Interior aluminum windows and doors specified for a premium finish.
9) Any other prefinished components, requiring a color selection
10) Electrical and mechanical items; light fixtures
11) Special accessories

8. Submit all exterior products requiring a color selection. Same requirements and procedures as listed above for interior color selections.

   a. Typical minimum exterior color package submittal:
      1) Paints and special coatings
      2) Masonry and Precast Materials
      3) Window and storefront finishes
      4) Tinted glazing
      5) Manufactured masonry products
      6) Prefinished metal products
      7) Prefinished copings, flashings, etc.
      8) Siding materials
      9) Light fixtures and electrical equipment
      10) Site appurtenances, if applicable
      11) Site Pavers, if applicable
      12) Other prefinished components, including plumbing, mechanical louvers, etc

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

   1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
   2. Manufacturer and product name, and model number if applicable.
   3. Number and name of room or space.
   4. Location within room or space.

F. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

G. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.

H. Certificates:

1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
2. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
4. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
5. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

I. Test and Research Reports:

1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:

    a. Name of evaluation organization.
    b. Date of evaluation.
    c. Time period when report is in effect.
    d. Product and manufacturers' names.
    e. Description of product.
    f. Test procedures and results.
    g. Limitations of use.

1.8 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.9 CONTRACTOR'S REVIEW

A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect and Construction Manager.

B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

1. Architect and Construction Manager will not review submittals received from Contractor that do not have Contractor's review and approval.

1.10 ARCHITECT'S AND CONSTRUCTION MANAGER'S REVIEW

A. Action Submittals: Architect and Construction Manager will review each submittal, indicate corrections or revisions required, and return it.

1. PDF Submittals: Architect and Construction Manager will indicate, via markup on each submittal, the appropriate action, as follows:
2. Submittals by Web-Based Project Software: Architect and Construction Manager will indicate, on Project software website, the appropriate action

a. Final Unrestricted Release: Where submittals are marked "Reviewed," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
b. Final-But-Restricted Release: When submittals are marked "Make Corrections Noted," that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.

c. Returned for Re-submittal: When submittal is marked "Rejected, Revise and Resubmit, Submit Specified Item," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.

1) Do not permit submittals marked "Rejected, Revise and Resubmit, Submit Specified Item", or for unmarked submittals, to be used at the Project site, or elsewhere where Work is in progress

B. Informational Submittals: Architect and Construction Manager will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect and Construction Manager will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect and Construction Manager.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Architect and Construction Manager will return without review submittals received from sources other than Contractor.

F. Submittals not required by the Contract Documents will be returned by Architect without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. The Contractor bears the sole responsibility for the quality of the work performed.

C. Quality control services include inspections and tests and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract observation activities performed by the Architect.

D. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
2. Specific test and inspection requirements are not specified in this Section.

E. Related Requirements:
1. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
2. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

A. Experienced: When used with an entity or individual, "experienced" unless otherwise further described means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

B. Field Quality-Control Tests: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

D. Mockups: Full-size physical assemblies that are constructed on-site either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

1. Laboratory Mockups: Full-size physical assemblies constructed and tested at testing facility to verify performance characteristics.
2. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as freestanding temporary built elements or as part of permanent construction, consisting of multiple products, assemblies, and subassemblies.
3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes; doors; windows; millwork; casework; specialties; furnishings and equipment; and lighting.

E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

G. Source Quality-Control Tests: Tests and inspections that are performed at the source; for example, plant, mill, factory, or shop.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Architect or Construction Manager.

1.4 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

1.5 CONFLICTING REQUIREMENTS

A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements are specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for direction before proceeding.

B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 ACTION SUBMITTALS

A. Delegated-Design Services Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

1.7 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:

1. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.

C. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

D. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.

7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

E. Reports: Prepare and submit certified written reports and documents as specified.

1.8 REPORTS AND DOCUMENTS

A. The independent testing agency shall submit a certified written report of each inspection, test or similar service, to the Architect, in duplicate, unless the Contractor is responsible for the service. If the Contractor is responsible for the service, submit a certified written report of each inspection, test or similar service through the Contractor, in duplicate.

B. Submit additional copies of each written report directly to the governing authority, when the authority so directs

C. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, telephone number, and email address of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspection.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

D. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

E. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, telephone number, and email address of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

F. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.9 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.

1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups of size indicated.
2. Build mockups in location indicated or, if not indicated, as directed by Architect or Construction Manager.
3. Notify Architect and Construction Manager days in advance of dates and times when mockups will be constructed.
4. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed to perform same tasks during the construction at Project.
5. Demonstrate the proposed range of aesthetic effects and workmanship.
6. Obtain Architect's and Construction Manager's approval of mockups before starting corresponding work, fabrication, or construction.

    a. Allow seven days for initial review and each re-review of each mockup.

7. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
8. Demolish and remove mockups when directed unless otherwise indicated.

1.10 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.

1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
2. Payment for these services will be made from testing and inspection allowances, as authorized by Change Orders.
3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform quality-control services.

a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents. Any required retesting or reinspecting will be at the expense of the contractor or subcontractor.

D. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, Construction Manager, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform duties of Contractor.
7. Contact Owner or Architect immediately of any irregularities or deficiencies observed, if Contractor fails to correct noted non-compliant Work

E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 "Submittal Procedures."

F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

G. Associated Contractor Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:

1. Access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.

3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Coordinate and submit concurrently with Contractor's Construction Schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, Construction Manager, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect, Construction Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
4. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
5. Retesting and reinspecting corrected work.

B. Special Tests and Inspections: Owner or Contractor as noted below will engage a qualified testing agency or special inspector to conduct special tests and inspections required by authorities having jurisdiction as indicated in individual Specification Sections, and as follows:

1. The Contractor will engage and pay for the services of an independent agency to perform specified quality control services. Generally they include:

a. Scoping and Videotaping of new sanitary waste lines under building slabs. Plumbing Contractor shall hire an independent agency to scope and camera all new sanitary sewer waste lines (3" and larger) under building slab to confirm adequate flow and compliance with documents. Video taping of lines shall be conducted after lines have been installed, covered, filled and activated. A copy of the report and tapes of videos shall be given to the Owner.
b. All other testing required by specification sections and not specifically identified as by the Owner shall be by the Contractor.

2. The Owner will engage and pay for the services of an independent agency to perform specified quality control services. Generally they include:

    a. Concrete testing: Contractor shall be responsible for notifying testing agency and coordinating testing with the work.
    b. Earthwork compaction testing: Contractor shall be responsible for notifying testing agency and coordinating testing with the work.
    c. Structural steel connections/welds.

3. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
4. Notifying Architect, Construction Manager, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
5. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, through Construction Manager, with copy to Contractor and to authorities having jurisdiction.
6. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
7. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
8. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

    1. Date test or inspection was conducted.
    2. Description of the Work tested or inspected.
    3. Date test or inspection results were transmitted to Architect.
    4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's and Construction Manager's reference during normal working hours.

    1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspection, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 014000

SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract. The term "approved" shall mean "no exception taken" in so far as the Architect's determination that submittals or work is observed to be in general compliance with the Contract. "Approval" does not relieve the Contractor of his duties to fulfill the contract.

C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."

D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. The term "indicated" refers to graphic representations, notes, or schedules on the Drawings, other paragraphs or schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as "shown," "noted," "scheduled," and "specified" are used, it is to help the reader locate the reference; no limitation on location is intended.

E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. "Provide": Furnish and install, complete and ready for the intended use.

I. "Project Site": Space available for performing construction activities either exclusively or in conjunction with others performing other work as part of the Project. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

J. Equal" shall mean reasonably and/or exactly identical to or better. The Architect shall be the sole judge of compliance to this definition, in regard to submittals, substitutions, and work performed and proposed.

K. "Similar to" shall mean the same as equal

1.3 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Conflicting Requirements: Where compliance with two or more standards is specified, and the standards establish different or conflicting requirements for minimum quantities or quality levels, the most stringent requirements will be enforced unless specifically indicated otherwise by the Architect. Requirements that are different, but apparently equal, and other uncertainties shall be referred to the Architect for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. In complying with these requirements, indicated numeric values are minimum or maximum, as appropriate for the context of the requirements. Refer uncertainties to the Architect for a decision before proceeding.

C. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

D. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format: These Specifications are organized into Divisions and Sections and generally based on the Construction Specifications Institute's Division format and MASTER FORMAT numbering system.

B. Specification Content: This Specification uses certain conventions in the use of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

1. Abbreviated Language: Language used in Specifications and other Contract Documents is the abbreviated type. Implied words and meanings will be appropriately interpreted. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and the full context of the Contract Documents so indicates.

a. The words "shall be" shall be included by inference wherever a colon (:) is used within a sentence or phrase.

C. Products and Manufacturer's Listings

1. Where one or more products is named and without reference to an equal one of those products shall be supplied unless a substitute is approved by the Architect by written addendum or other contract modification procedure.
2. Where one or more products is named and associated with the phrases "or approved equal", or "or equal", "...similar to...", or similar language, the Contractor may substitute equal products by another manufacturer. See above for definition of equal. Any risks associated with the Architect making a judgement of "not equal" are the responsibility of the Contractor.
3. Where one or more named products is not available or conflicts with a model no. or performance requirement, or is otherwise ambiguous or unclear, the Contractor shall inform the Architect pri-or to bidding for a clarification by addendum.

D. Performance Requirements

1. Where a specific product is not named, and instead performance requirements and design criteria are indicated, the Contractor may submit a product which meets or exceeds such requirements.
2. Where performance criteria are indicated in addition to a named product, both requirements shall be met, or the more specific, stringent, or higher value, criteria shall be met. Any conflicts or ambiguities shall be reported to the Architect for clarification by pre-bid addendum.

1.5 GOVERNING REGULATIONS/AUTHORITIES

A. The Architect has contacted authorities having jurisdiction where necessary to obtain information necessary for preparation of Contract Documents; that information may or may not be of significance to the Contractor. Contact authorities having jurisdiction directly for information and decisions having a bearing on the Work.

1.6 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.

1. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
2. ICC - International Code Council; www.iccsafe.org.
3. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.

C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.

1. COE - Army Corps of Engineers; www.usace.army.mil.
2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
4. DOD - Department of Defense; www.quicksearch.dla.mil.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
8. FG - Federal Government Publications; www.gpo.gov/fdsys.
9. GSA - General Services Administration; www.gsa.gov.
10. HUD - Department of Housing and Urban Development; www.hud.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.gpo.gov/fdsys.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. FS - Federal Specification; Available from DLA Document Services; www.quicksearch.dla.mil.

    a. Available from Defense Standardization Program; www.dsp.dla.mil.
    b. Available from General Services Administration; www.gsa.gov.
    c. Available from National Institute of Building Sciences/Whole Building Design Guide; www.wbdg.org/ccb.

6. MILSPEC - Military Specification and Standards; (See DOD).
7. USAB - United States Access Board; www.access-board.gov.
8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 014200

SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Administrative procedures for handling requests for substitutions made after award of the Contract are included under Section "Product Substitutions."

C. Related Requirements:

1. Section 012500 "Substitution Procedures" for requests for substitutions.
2. Section 014200 "References" for applicable industry standards for products specified.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
3. Comparable Product: Product that is demonstrated and approved by Architect through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
4. "Materials" are products that are substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.
5. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping

B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification.

C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications. Submit a comparable product request, if applicable.

1.4 ACTION SUBMITTALS

A. Comparable Product Request Submittal: Submit request for consideration of each comparable product. Identify basis-of-design product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within (2) two weeks of receipt of a comparable product request. Architect will notify Contractor through Construction Manager of approval or rejection of proposed comparable product request within **15** days of receipt of request, or **seven** days of receipt of additional information or documentation, whichever is later.

    a. Form of Architect's Approval of Submittal: As specified in Section 013300 "Submittal Procedures."
    b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300 "Submittal Procedures." Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.

B. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

C. Identification of Products: Except for required labels and operating data, do not attach or imprint manufacturer or product names or trademarks on exposed surfaces of products or equipment that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface, or, where required for observation following installation, on a visually accessible surface that is not conspicuous.
2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on a visually accessible but inconspicuous surface. Include information essential for operation, including the following:

    a. Name of product and manufacturer.
    b. Model and serial number.
    c. Capacity.
    d. Speed.
    e. Ratings.

3. See individual identification sections in Divisions 21, 22, 23, and 26 for additional identification requirements.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.

1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. See other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
3. Where products are accompanied by the term "as selected," Architect will make selection.
4. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
5. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.

a. Submit additional documentation required by Architect through Construction Manager in order to establish equivalency of proposed products. Evaluation of "or equal" product status is by the Architect, whose determination is final.

B. Product Selection Procedures:

1. Sole Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

a. Sole product may be indicated by the phrase: "Subject to compliance with requirements, provide the following: …"

2. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

   a. Sole manufacturer/source may be indicated by the phrase: "Subject to compliance with requirements, provide products by the following: …"

3. Limited List of Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will will not be considered unless otherwise indicated.

   a. Limited list of products may be indicated by the phrase: "Subject to compliance with requirements, provide one of the following: …"

4. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, which complies with requirements.

   a. Non-limited list of products is indicated by the phrase: "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following: …"

5. Limited List of Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will will not be considered unless otherwise indicated.

   a. Limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, provide products by one of the following: …"

6. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, which complies with requirements.

   a. Non-limited list of manufacturers is indicated by the phrase: "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following: …"

7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

   a. For approval of products by unnamed manufacturers, comply with requirements in Section 012500 "Substitution Procedures" for substitutions for convenience.

C. Visual Matching Specification: Where Specifications require "match Architect's sample," provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration of Comparable Products: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant product qualities include attributes such as type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
2. Evidence that proposed product provides specified warranty.
3. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
4. Samples, if requested.

B. Submittal Requirements: Approval by the Architect of Contractor's request for use of comparable product is not intended to satisfy other submittal requirements. Comply with specified submittal requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 016000

SECTION 017300 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner-installed products.
6. Progress cleaning.
7. Starting and adjusting.
8. Protection of installed construction.
9. Correction of Work

B. Related Requirements:

1. Section 011000 "Summary" for limits on use of Project site.
2. Section 013300 "Submittal Procedures" for submitting surveys.
3. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
4. Section 024119 "Selective Demolition" for demolition and removal of selected portions of the building.
5. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.

B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 PREINSTALLATION MEETINGS

A. Cutting and Patching Conference: Conduct conference at Project site.

1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:

    a. Construction Manager's superintendent.
    b. Trade supervisor responsible for cutting operations.
    c. Trade supervisor(s) responsible for patching of each type of substrate.
    d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affecting by cutting and patching operations.

2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.5 INFORMATIONAL SUBMITTALS

A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:

1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
3. Products: List products to be used for patching and firms or entities that will perform patching work.
4. Dates: Indicate when cutting and patching will be performed.
5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.

    a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.6 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.

1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.

2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:

    a. Primary operational systems and equipment.
    b. Fire separation assemblies.
    c. Air or smoke barriers.
    d. Fire-suppression systems.
    e. Plumbing piping systems.
    f. Mechanical systems piping and ducts.
    g. Control systems.
    h. Communication systems.
    i. Fire-detection and -alarm systems.
    j. Conveying systems.
    k. Electrical wiring systems.
    l. Operating systems of special construction.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:

    a. Water, moisture, or vapor barriers.
    b. Membranes and flashings.
    c. Exterior curtain-wall construction.
    d. Sprayed fire-resistive material.
    e. Equipment supports.
    f. Piping, ductwork, vessels, and equipment.
    g. Noise- and vibration-control elements and systems.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services; and other utilities.
2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:

1. Description of the Work.
2. List of detrimental conditions, including substrates.
3. List of unacceptable installation tolerances.
4. Recommended corrections.

D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements.

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect and Construction Manager promptly.

B. General: Lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
2. Establish limits on use of Project site.
3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect and Construction Manager when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect and Construction Manager.

3.4 FIELD ENGINEERING

A. Identification: Owner will identify existing benchmarks, control points, and property corners.

B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect or Construction Manager. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect and Construction Manager before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

C. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
4. Maintain minimum headroom clearance of 96 inches in occupied spaces and 90 inches in unoccupied spaces.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Where possible, select tools or equipment that minimize production of excessive noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.

1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
2. Allow for building movement, including thermal expansion and contraction.
3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

K. Repair or remove and replace damaged, defective, or nonconforming Work.

1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.

1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.

1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

    a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    b. Restore damaged pipe covering to its original condition.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

    a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 OWNER-INSTALLED PRODUCTS

A. Site Access: Provide access to Project site for Owner's construction personnel.

B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.8 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.

1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

    a. Use containers intended for holding waste materials of type to be stored.

4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.

1. Remove liquid spills promptly.
2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.9 STARTING AND ADJUSTING

A. Coordinate startup and adjusting of equipment and operating components with requirements in Section 019113 "General Commissioning Requirements."

B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

C. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

E. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

3.10 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Protection of Existing Items: Provide protection and ensure that existing items to remain undisturbed by construction are maintained in condition that existed at commencement of the Work.

C. Comply with manufacturer's written instructions for temperature and relative humidity.

3.11 CORRECTION OF THE WORK

A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.

1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

B. Restore permanent facilities used during construction to their specified condition.

C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.

E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Substantial Completion procedures.
2. Final completion procedures.
3. Warranties.
4. Final cleaning.
5. Repair of the Work.

B. Related Requirements:

1. Section 013233 "Photographic Documentation" for submitting final completion construction photographic documentation.
2. Section 017823 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
3. Section 017839 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
4. Section 017900 "Demonstration and Training" for requirements to train the Owner's maintenance personnel to adjust, operate, and maintain products, equipment, and systems.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of cleaning agent.

B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at final completion.

1.4 CLOSEOUT SUBMITTALS

A. Certificates of Release: From authorities having jurisdiction.

B. Certificate of Insurance: For continuing coverage.

C. Field Report: For pest control inspection.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.6 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Construction Manager. Label with manufacturer's name and model number.
5. Submit testing, adjusting, and balancing records.
6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.Advise Owner of pending insurance changeover requirements.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup and testing of systems and equipment.
9. Perform preventive maintenance on equipment used prior to Substantial Completion.
10. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
11. Advise Owner of changeover in utility services.
12. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
13. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
14. Complete final cleaning requirements.
15. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.

C. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Upon written statement from the Contractor that the Work is complete, the Architect will repeat the inspection and notification procedure. In the event the work is not complete, the Architect will repeat the inspection process one (1) additional time only. Further inspection procedures will be at the expense of the Contractor.
2. Results of completed inspection will form the basis of requirements for final completion.
3. Release of Retainage or portions there of will not be approved without Consent of Surety.
4. Release of retainage or portions thereof will be determined by a multiplier of 200% applied to all remaining work not complete. Inspections to determine status of work complete and , therefore, release of retainage and pay applications are contingent upon the limits to number of inspections indicated above.
5. Also see Supplemental Conditions.
6. Provide final revised Closeout Checklist provided at end of this section

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.
5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.
6. Submit an updated final statement, accounting for final additional changes to the Contract Sum.
7. Submit consent of surety to final payment.
8. Submit a final liquidated damages settlement statement.
9. Submit record drawings, maintenance manuals, final project photographs, damage or settlement survey, property survey, and similar final record information

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect and Construction Manager will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.8 INSPECTION SUMMARY

A. Architect will conduct one (1) inspection at notification for Substantial Completion.

B. Architect will conduct only one (1) additional inspection, if necessary, for determining Substantial Completion.

C. Architect will conduct one (1) inspection for Final Completion.

D. Architect will conduct only one (1) additional inspection, if necessary, for Final Completion.

E. Any additional inspections for Substantial Completion or Final Completion will be at the cost of the Contractor.

1.9 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:

    a. Project name.
    b. Date.
    c. Name of Architect and Construction Manager.
    d. Name of Contractor.
    e. Page number.

4. Submit list of incomplete items in the following format:

    a. PDF electronic file. Architect, through Construction Manager, will return annotated file.
    b. Web-based project software upload. Utilize software feature for creating and updating list of incomplete items (punch list).

1.10 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where warranties are indicated to commence on dates other than date of Substantial Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.

C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.

D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1. Submit by uploading to web-based project software site.

E. Warranties in Paper Form:

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

F. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

1. Use cleaning products that comply with the Authority having jurisdiction’s maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:

a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
d. Remove tools, construction equipment, machinery, and surplus material from Project site.
e. Remove snow and ice to provide safe access to building.
f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
k. Remove labels that are not permanent.
l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.

    1) Clean HVAC system in compliance with Section 230130.51 "HVAC Air-Distribution System Cleaning." Provide written report on completion of cleaning.

p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
q. Leave Project clean and ready for occupancy.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare written report.

D. Construction Waste Disposal: Comply with waste disposal requirements of local jurisdiction.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that that already show evidence of repair or restoration.

a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory manuals.
2. Emergency manuals.
3. Systems and equipment operation manuals.
4. Systems and equipment maintenance manuals.
5. Product maintenance manuals.

B. Related Requirements:

1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operation and maintenance submittals is acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operation and maintenance manuals in the following format:

1. Submit by uploading to web-based project software site. Enable reviewer comments on draft submittals.

2. Submit three paper copies. Architect, through Construction Manager, will return two copies.

C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

A. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.

1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

B. Manuals, Paper Copy: Submit manuals in the form of hard-copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered, binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

    a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment. Enclose title pages and directories in clear plastic sleeves.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

    a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: Include the following information:

1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Contractor.
6. Name and contact information for Construction Manager.
7. Name and contact information for Architect.
8. Name and contact information for Commissioning Authority.
9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
10. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:

1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.8 EMERGENCY MANUALS

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Content: Organize manual into a separate section for each of the following:

1. Type of emergency.
2. Emergency instructions.
3. Emergency procedures.

C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:

1. Fire.
2. Flood.
3. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. Chemical release or spill.

D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

E. Emergency Procedures: Include the following, as applicable:

1. Instructions on stopping.
2. Shutdown instructions for each type of emergency.
3. Operating instructions for conditions outside normal operating limits.
4. Required sequences for electric or electronic systems.
5. Special operating instructions and procedures.

1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has delegated design responsibility.
3. Operating standards.
4. Operating procedures.
5. Operating logs.
6. Wiring diagrams.
7. Control diagrams.
8. Piped system diagrams.
9. Precautions against improper use.
10. License requirements including inspection and renewal dates.

C. Descriptions: Include the following:

1. Product name and model number. Use designations for products indicated on Contract Documents.
2. Manufacturer's name.
3. Equipment identification with serial number of each component.
4. Equipment function.
5. Operating characteristics.
6. Limiting conditions.
7. Performance curves.
8. Engineering data and tests.
9. Complete nomenclature and number of replacement parts.

D. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:

1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

    a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
3. Identification and nomenclature of parts and components.
4. List of items recommended to be stocked as spare parts.

E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:

1. Test and inspection instructions.
2. Troubleshooting guide.

3. Precautions against improper maintenance.
4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
5. Aligning, adjusting, and checking instructions.
6. Demonstration and training video recording, if available.

F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of maintenance manuals.

1.11 PRODUCT MAINTENANCE MANUALS

A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.

4. Material and chemical composition.
5. Reordering information for specially manufactured products.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:

1. Inspection procedures.
2. Types of cleaning agents to be used and methods of cleaning.
3. List of cleaning agents and methods of cleaning detrimental to product.
4. Schedule for routine cleaning and maintenance.
5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 017823

SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.
4. Miscellaneous record submittals.

B. Related Requirements:

1. Section 011200 "Multiple Contract Summary" for coordinating project record documents covering the Work of multiple contracts.
2. Section 017300 "Execution" for final property survey.
3. Section 017700 "Closeout Procedures" for general closeout procedures.
4. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up record prints.
2. Number of Copies: Submit copies of record Drawings as follows:

a. Initial Submittal:

1) Submit one paper-copy set(s) of marked-up record prints.
2) Submit PDF electronic files of scanned record prints and one of file prints.
3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.

b. Final Submittal:

1) Submit PDF electronic files of scanned record prints and three set(s) of prints.
2) Print each drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit one paper copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.4 RECORD DRAWINGS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistant location; provide access to record documents for the Architect's reference during normal working hours.

B. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an acceptable drawing technique.
c. Record data as soon as possible after obtaining it.
d. Record and check the markup before enclosing concealed installations.
e. Cross-reference record prints to corresponding photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j. Changes made by Change Order or Construction Change Directive.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.

m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

C. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect and Construction Manager. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:

1. Format: Annotated PDF electronic file with comment function enabled.
2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Architect through Construction Manager for resolution.
4. Architect will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.

a. Architect will provide data file layer information. Record markups in separate layers.

D. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
2. Format: Annotated PDF electronic file with comment function enabled.
3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
4. Identification: As follows:

a. Project name.
b. Date.
c. Designation "PROJECT RECORD DRAWINGS."
d. Name of Architect and Construction Manager.
e. Name of Contractor.

1.5 RECORD SPECIFICATIONS

A. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation.

1. Upon completion of the Work, submit record Specifications to the Architect for the Owner's records.

B. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders, record Product Data, and record Drawings where applicable.

C. Format: Submit record Specifications as scanned PDF electronic file(s) of marked-up paper copy of Specifications.

1.6 RECORD PRODUCT DATA

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Organize by specification section. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.

1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
3. Note related Change Orders, record Specifications, and record Drawings where applicable.

C. Format: Submit record Product Data as scanned PDF electronic file(s) of marked-up paper copy of Product Data.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

B. Format: Submit miscellaneous record submittals as scanned PDF electronic file(s) of marked-up miscellaneous record submittals.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 MAINTENANCE OF RECORD DOCUMENTS

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.

B. Maintenance of Record Documents: Store record documents in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's and Construction Manager's reference during normal working hours.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 017839

SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Demonstration of operation of systems, subsystems, and equipment.
   2. Training in operation and maintenance of systems, subsystems, and equipment.
   3. Demonstration and training video recordings.

B. Related Sections:
   1. Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
   1. At completion of training submit one complete training manual(s) for Owner’s use.

B. Attendance Record: For each training session, submit list of participants and length of instruction time.

1.4 QUALITY ASSURANCE

A. Instructor Qualifications: Equipment installer if experienced in equipment procedures or an authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations and personnel. Adjust schedule as required to ensure availability of Owner’s personnel.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training sessions for each system and for equipment not part of a system, as required by **individual Specification Sections** and as follows:.
   1. Motorized doors, including automatic entrance doors.
   2. Equipment, including projection screens food-service equipment.
   3. Fire-protection systems, including fire alarm.
   4. Intrusion detection systems.
   5. HVAC systems, including air-handling equipment, air distribution systems and terminal equipment and devices.
   6. HVAC instrumentation and controls.

7. Electrical service and distribution, including transformers, switchboards, panelboards, uninterruptible power supplies and motor controls.
8. Packaged engine generators, including transfer switches.
9. Lighting equipment and controls.
10. Communication systems, including intercommunication, surveillance, clocks and programming, voice and data.

B. Training Modules: Develop a learning objective and teaching outline for each module. For each module, include instruction for the following as applicable:
   1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
      a. System, subsystem, and equipment descriptions.
      b. Operating standards.
      c. Regulatory requirements.
      d. Equipment function.
      e. Operating characteristics.
      f. Limiting conditions.
   2. Documentation: Review the following items:
      a. Emergency manuals.
      b. Operations manuals.
      c. Maintenance manuals.
      d. Identification systems.
      e. Maintenance service agreements and similar continuing commitments.
      f. Warranties and Bonds
   3. Emergencies: Include the following, as applicable:
      a. Instructions on meaning of warnings, trouble indications, and error messages.
      b. Instructions on stopping.
      c. Shutdown instructions for each type of emergency.
      d. Operating instructions for conditions outside of normal operating limits.
      e. Sequences for electric or electronic systems.
      f. Special operating instructions and procedures.
   4. Operations: Include the following, as applicable:
      a. Startup procedures.
      b. Equipment or system break-in procedures.
      c. Routine and normal operating instructions.
      d. Regulation and control procedures.
      e. Control sequences.
      f. Safety procedures.
      g. Instructions on stopping.
      h. Normal shutdown instructions.
      i. Operating procedures for emergencies.
      j. Operating procedures for system, subsystem, or equipment failure.
      k. Seasonal and weekend operating instructions.
      l. Required sequences for electric or electronic systems.
      m. Special operating instructions and procedures.
   5. Adjustments: Include the following:
      a. Alignments.
      b. Checking adjustments.
      c. Noise and vibration adjustments.
      d. Economy and efficiency adjustments.
   6. Troubleshooting: Include the following:
      a. Diagnostic instructions.
      b. Test and inspection procedures.

7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning and procedures for routine cleaning.
   c. Procedures for preventive and routine maintenance.
   d. Instruction on use of special tools.
8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training. Assemble training modules into a training manual.

B. Set up instructional equipment at instruction location or arrange for instruction at equipment locations.

3.2 INSTRUCTION

A. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
   1. Owner will furnish Contractor with names and positions of participants.

B. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
   1. Schedule training with Owner with at least seven days' advance notice.
   2. Training location and reference material: conduct training on-site in completed and fully operational facility using the actual equipment in place. Conduct training using final operation maintenance data.

C. Cleanup: Restore systems and equipment to condition existing before initial training use.

END OF SECTION 017900

SECTION 017910 - WARRANTIES AND BONDS

PART 1 - PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties.
   1. Refer to the General Conditions for terms of the Contractor's special warranty of workmanship and materials.

B. General closeout requirements are included in Section "Closeout Procedures."
   1. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Divisions-2 through 49.

C. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required to countersign special warranties with the Contractor.

1.3 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty: When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective Work regardless of whether the Owner has benefited from use of the Work through a portion of its anticipated useful service life.

D. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

E. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

PART 2 - PART 2 - PRODUCTS (not applicable).

PART 3 - PART 3 - EXECUTION

3.1 SCHEDULE OF WARRANTIES

A. Construction Manager's Warranty: The Construction Manager shall provide the Owner with a minimum one year warranty on the entire project in addition to specific warranties. Warranty period shall begin at time of Substantial Completion; except that for punch list items, and/or items not deemed complete or properly functioning as intended, the warranty shall begin from the point the Owner/Architect accepts the item as complete.

B. Schedule: Provide warranties and bonds on products and installations not specifically mentioned in this section but included in Sections 2-49.

END OF SECTION 017910

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 033300 "Architectural Concrete" for general building applications of specially finished formed concrete.
2. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
3. Section 321313 "Concrete Paving" for concrete pavement and walks.
4. Section 321316 "Decorative Concrete Paving" for decorative concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Concrete Subcontractor.
e. Special concrete finish Subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures,

construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, methods for achieving specified floor and slab flatness and levelness floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer

B. Welding certificates.

C. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Curing compounds.
7. Floor and slab treatments.
8. Bonding agents.
9. Adhesives.
10. Vapor retarders.
11. Semirigid joint filler.
12. Joint-filler strips.
13. Repair materials.

D. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

F. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

G. Field quality-control reports.

H. Minutes of preinstallation conference.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.

E. Mockups: Cast concrete formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.

1. Build panel approximately 100 sq. ft. for formed surface in the location indicated or, if not indicated, as directed by Architect.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.10 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1, and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301.
2. ACI 117.

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.
b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
c. Structural 1, B-B or better; mill oiled and edge sealed.
d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

3. Overlaid Finnish birch plywood.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

F. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

G. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.
3. For zinc-coated reinforcement, use galvanized wire or dielectric-polymer-coated wire bar supports.

2.5 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I, gray.
2. Fly Ash: ASTM C 618, Class F or C.
3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.

C. Normal-Weight Aggregates: ASTM C 33/C 33M. Conform to aggregates for 47B concrete with limestone per “Standard Specifications for Highway Construction by State of Nebraska Department of Roads.

1. Maximum Coarse-Aggregate Size: 1 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C 260/C 260M.

E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

F. Color Pigment: ASTM C 979/C 979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
1. Color: Match Architect's sample

G. Water: ASTM C 94/C 94M and potable.

2.6 FIBER REINFORCEMENT

A. Synthetic Macro-Fiber: Polyolefin macro-fibers engineered and designed for use in concrete, complying with ASTM C 1116/C 1116M, Type III, 1 to 2-1/4 inches long.

2.7 VAPOR RETARDERS

A. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 15 mils thick.

2.8 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

2.9 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

H. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

I. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.10 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80according to ASTM D 2240.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.022-inch thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.11 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.12 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Slag Cement: 50 percent.

4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
5. Silica Fume: 10 percent.
6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
7. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

D. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.50.
3. Maximum Aggregate Size: 1-1/2-inch.
4. Slump Limit: 4 inches, plus or minus 1 inch before addition of admixtures.
5. Air Content: 4.5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

B. Foundation Walls: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.50.
3. Maximum Aggregate Size: 1-inch.
4. Slump Limit: 4, plus or minus 1 inch before addition of admixtures.
5. Air Content: 4.5 percent, plus or minus 1.5 percent at point of delivery for 1-inch nominal maximum aggregate size.

C. Slabs-on-Grade: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.45.
3. Maximum Aggregate Size: 1-inch
4. Slump Limit: 3 inches, plus or minus 1 inch before addition of admixtures.
5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

D. Building Walls: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.5.
3. Slump Limit: 5 inches, plus or minus 1 inch before addition of admixtures.
4. Air Content: [4.5] percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

2.14 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.15 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
1. Concrete noted as “Architecturally Exposed Concrete: Class A.
2. Concrete exposed to view of to receive membrane waterproofing: Class B
3. Footings: Class D.
4. All other concrete: Class C.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORING AND RESHORING INSTALLATION

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.

1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 VAPOR-RETARDER INSTALLATION

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

3.6 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls 30 feet. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view .

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.

C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1-1/2 parts fine sand with a 1:1

mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.

3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view or [o be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:

    a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
    b. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
    c. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.
    d. Specified overall values of flatness, F(F) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24.

3. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.

D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.11 MISCELLANEOUS CONCRETE ITEM INSTALLATION

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 4 inches high unless otherwise indicated, and extend base not less than 8 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
3. Minimum Compressive Strength: 4000 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 12-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.12 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 305.1 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
    c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

    a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 LIQUID FLOOR TREATMENT APPLICATION

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than 28 days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.14 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.16 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

    a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C 567/C 567M, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C 31/C 31M.

    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
    b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
15. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness according to ASTM E 1155 as soon as slabs can tolerate foot traffic, and before shores are removed.

3.17 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 033000

SECTION 033543 - POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Polished concrete finishing and scoring.
2. Sealed concrete finishing.
3. Concrete for polished concrete at Cafe, including concrete materials, mixture design, placement procedures, initial finishing, and curing is specified in Section 033000 "Cast-in-Place Concrete."

B. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for concrete areas to be polished and areas not to be polished.

1.3 DEFINITIONS

A. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of polished concrete.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with polished concrete to attend, including the following:

a. Contractor's superintendent.
b. Independent testing agency responsible for concrete design mixtures.
c. Ready-mix concrete manufacturer.
d. Cast-in-place concrete subcontractor.
e. Polished concrete finishing Subcontractor.

2. Review cold and hot weather concreting procedures, curing procedures, construction joints, concrete repair procedures, concrete finishing**,** and protection of polished concrete.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Polishing Schedule: Submit plan showing polished concrete surfaces and schedule of polishing operations for each area of polished concrete before start of polishing operations. Include locations of all joints, including construction joints.

C. Samples for Initial Selection: For each type of product requiring polished finish.

D. Samples for Verification: For each type of polished finish.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Repair materials.
2. Liquid floor treatments.

1.7 QUALITY ASSURANCE

A. Field Sample Panels: After approval of verification sample and before casting concrete, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, approximately 60 by 60 inches (1500 by 1500 mm) minimum, to demonstrate the expected range of finish, color, and appearance variations.

1. Locate panels as indicated or, if not indicated, as directed by Architect.
2. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
3. Demolish and remove field sample panels when directed.

B. Mockups: Before casting concrete, build mockups to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Demonstrate curing, finishing, and protecting of polished concrete.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 FIELD CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 POLISHED CONCRETE (PC)

A. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces leaving no surface film. Acceptable manufactures and products include:

1. Prosoco, Consolideck LS
2. L & M Construction Chemicals, Inc., FGS Hardener Plus.
3. Approved equals.

2.2 SEALED CONCRETE (SC)

A. Protective Sealer: Clear, fast drying, non-yellowing curing and sealing compound.

1. Basis-of Design product: Gloss finish cure-seal for concrete is based on SpecChem “Surface Shine” or a comparable product by one of the following:

a. Bomanite: Cure and Seal SB.
b. Prosoco: Consolideck Durasheen..

PART 3 - EXECUTION

3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: Comply with manufacturer's product data, including product technical bulletins, product catalog installation instructions and product carton instructions for installation.

3.2 EXAMINATION

A. Do not begin installation until substrates have been properly prepared and are suitable for application of product.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.3 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Do not use frozen material. Thaw and agitate prior to use.

D. If construction equipment must be used for application, diaper all components that might drip oil, hydraulic fluid or other liquids.

3.4 POLISHING

A. Slab Flatness: Provide a flat (FF50 or greater), level slab in areas to be polished as required to minimize grinding in order to achieve the specified aggregate exposure.

B. Level of cut: Level 1 - Cream Finish: Polishing only the Portland Cement paste at the surface without exposing small, medium or large aggregate. This is Class A cream finish as defined by ASCC-CP chart titled "Polished Concrete Aggregate Exposure Chart" which defines a general level of expectation for three aggregate exposure classes A, B & C.

C. Finish: Standard High Gloss, 1,500 grit.

D. Apply polished concrete finish system to cured and prepared slabs to match accepted mockup.

1. Machine grind floor surfaces to receive polished finishes level and smooth.
2. Apply reactive stain for polished concrete in polishing sequence and according to manufacturer's written instructions.
3. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.
4. Continue polishing with progressively finer-grit diamond polishing pads to gloss level, to match approved mockup.
5. Control and dispose of waste products produced by grinding and polishing operations.
6. Neutralize and clean polished floor surfaces.

E. Scoring: Score decorative jointing in concrete surfaces 1/8 inch (3.3 mm) deep with diamond blades to match pattern indicated. Rinse until water is clear.

1. Joint Width: 1/4 inch (6.7 mm).
2. Fill joints flush to surface prior to start of polishing operations.

F. Adjustments: Re-polish those areas not meeting specified gloss levels per mockup.

G. Protection: Concrete surfaces to be polished shall be protected throughout construction. Comply with ASCC-CPC's comprehensive list of protection criteria to include, but not limited to:

1. Before: After pouring slab, protect areas to be polished to avoid staining and damage with compatible protection board (tape joints).

2. After: Once slab areas are completely polished, protect with a compatible protection board (tape joints) in accordance with manufactures recommendations until ready to be exposed during final cleanup.

3.5 SEALED CONCRETE

A. Cover surfaces uniformly, creating a continuous film.

B. Sealing new concrete:

1. Apply two coats. Add the second coat four hours after the first application
2. Pad polish the floor in a cross-hatch pattern, edge to edge

END OF SECTION 033543

WORK PACKAGE 10
COLBERN ROAD BRANCH
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SECTION 033600 – INTEGRALLY COLORED CONCRETE

1 SUMMARY

1.1 Drawings and general provisions of Contract, which would include General and Supplementary conditions and Division I Specification sections.

1.2 Section includes:

A. Integrally colored concrete (slabs-on-grade, sidewalks, driveways, patios, roads, parking lots, and other exterior concrete pavements)
B. Stamping & texturing of concrete
C. Curing of integrally colored and/or stamped concrete

2 SUBMITTALS

Product Data: Submit manufacturer's complete technical data sheets for the following:

2.1 Colored admixture

2.2 Curing compound & sealing

- Design Mixes: for each type of integrally colored concrete
- Samples for Initial Selections: manufacturer's color charges showing a full range of colors available
- Qualification data: For firms indication in Quality Assurance Article, including list of complete projects

2 QUALITY ASSURANCE

2.1 Manufacturer Qualifications: Manufacturer with 10-years experience in production of specified products

2.2 Installer Qualifications: An installer with 5 years experience with work of similar scope and quality

2.3 Consider contractors with ACI flatwork certification (640 & 601-D)

2.4 Comply with the requirements of ACI 310

2.5 Obtain each specified material from same source and maintain high degree of consistence in workmanship throughout Project

2.6 Notification of manufacturer's authorized representative shall be given at least 1 week before start of work

2.7 Color charts and small sample submittals provide only a general indication of color: color and appearance of completed work may differ. On large or critical projects, specify a mockup or field sample to demonstrate that proposed materials and workmanship produce acceptable concrete appearance.

2.8 Integrally Colored Concrete (Mockups/Field Samples)

- Provide under provisions of Division I Section (Quality Control)

- At location on Project selected by Architect, Landscape Architect, or Engineer place and finish. Example: 2 feet by 2 feet area
- Construct (mockup/sample panel) using processes and techniques intended for use on permanent work, including curing procedures. Include samples of control, construction, and expansion joints in sample panels. (Mockup/Field sample) shall be produced by the individual workers who will perform the work for the project.
- Retain samples of cements, sands, aggregates and color additives used in mockup for comparison with materials used in remaining work.
- Accepted (mockup/field sample) provides visual standard for work of Section.
- (Mockup/Field sample) shall remain through completion of the work for use as a quality standard for finished work.

3 DELIVERY, STORAGE AND HANDLING

- Colored admixture: Comply with manufacturer's instructions. Deliver colored admixtures in original, unopened packaging. Store in dry conditions.
- Avoid freezing temperatures
  Reference ACI 304 Measuring, Mixing, Transportation & Placement

4 PROJECT CONDITIONS
Integrally Colored Concrete Environmental Requirement:

4.1 Schedule placement of concrete to minimize exposure to wind and hot sun before curing materials is applied.

4.2 Consider use of evaporation retardants in adverse weather.

4.3 Avoid placing concrete if rain, snow, or frost is forecast within 24 hours. Protect fresh concrete from moisture and freezing.

4.4 Pour colored concrete on well compacted firm sub bases-be sure these are well drained.

4.5 Never pour on frozen subgrade (keeping subgrade temperatures and concrete temperatures within 25 F of each other will give better results.

4.6 Comply with professional practices described in ACI 305R and ACI 306R.

- Schedule delivery of concrete to provide consistent mix times from batching until discharge. Mix times shall meet manufacturer's written recommendation.

5 PRODUCTS

Acceptable Manufacturer, ChemSystems, 10101 Genard Road, Houston TX, 77041 1-800- 545-9827 or the appropriate local contact, Decorative Concrete Supply, Shawnee, Kansas 913- 422-4443 or owner approved supplier.

6 MATERIALS
Colored Admixture for Integrally Colored Concrete: ChemSystems

6.1 No calcium chloride with coloring agents that are lime proof and UV resistant. Non-chloride admixtures may be considered BEFORE job begins.

6.2 Colored admixture shall conform to the requirements of ACI 310, ACI 303.1, ASTM C979, ASTM C494, and AASHTO M194.

- Curing Compound for Integrally Colored Concrete:
  1. Curing compound shall comply with ASTM C309 and some may contain colors.
  2. Curing Compounds meeting ASTM C 1315 may also be used and a 2nd coat applied after 30 days of air dry time (this ASTM is for curing compounds having special properties).

  Select a curing compound that has a proven record with colored concrete.

6.3 Substitutions: The use of products other than those specified will be considered providing that the Contractor requests its use in writing within 3 days prior to bid date. This request shall be accompanied by the following:

- A Certificate of compliance from the material manufacturer stating that proposed products meet or exceed requirements of this Section, including standards ACI 310, ACI303.1, ASTM C979, ASTM C494 and AASHTO M194.
- Documented proof that proposed materials have a 5 year proven record of performance for coloring concrete, confirmed at least 5 local projects that the Architects, Landscape Architects, and/or Engineer can examine.

COLORS AND PATTERNS

A. Cement: Color shall be gray or white.
B. Sand: Color shall be locally available, natural sand or manufactured white sand.
C. Aggregate: Concreter producers standard aggregate complying with specifications.
D. Colored Admixture: As selected by Architect, Landscape Architect, Engineer from ChemSystems Color Chart.

CONCRETE MIX DESIGN

- Minimum Cement Content: (6) sacks per cubic yard of concrete.
- Slump of concrete shall be consistent throughout Project at 4 inches or less. At no time shall slump exceed 5 inches (If super plasticizers are allowed, slump shall not exceed 8 inches.
- Aggregates should be carefully selected for hardness, soundness, cleanliness and be free of any impurities.
- Do not add calcium chloride to mix as it causes mottling and surface discoloration.
- Supplemental admixtures shall not be used unless approved by manufacturer.
- Do not add water to the mix in the field.
- Add colored admixture to the mix according to manufacturer's written instructions in pre-measured bags, by weight of cement content.
- Use of fiber-mesh is recommended in these applications.
- Use of SCM such as fly-ash or slag should be addressed before placement begins no substitutions of SCM will be allowed after construction begins.

7 EXECUTION

7.1 Installation

- Install concrete according to requirements of City of Lee's Summit
- Do not add water to the mix in the field (unless pre-planned).
- Do not apply water to the concrete surface
- Surfaces shall be finished uniformly with the following finish:
  A. Surfaces shall be finished uniformly with the following finish:

- Broomed: Pull broom across freshly, floated, troweled, concrete to produce fine, medium, coarse texture in straight, wavy lines perpendicular to main line of traffic. Do not dampen brooms.
- Swirl: Float concrete. Work float flat on surface using pressure in swirling manner to produce series of uniform arcs and twists. Use aluminum or magnesium float to produce medium texture. Use wood float to provide coarse texture.
- Trowel: Precautions should e taken to ensure that surface is uniformly troweled so that it will not be slippery. Do not overtrowel or burnish surface.
- Exposed Aggregate: Finish concrete and apply chemical surface retarders according to manufacturer's written instructions. Wash surface to match originally approved mockup field sample. Apply curing compounds after washing and when surface is dry.
- Stamped/Imprinted: Apply pattern according to tool manufacturer's instructions. Touch-up pattern and finish edges with hand tools as necessary. Use stamps that are easy to fit and use "flex mats' along edges and walls for easier imprinting, carefully lift each stamp as you move.

7.2 CURING

1. Use curing and sealing compound for integrally colored concrete according to manufacturer's instructions using manufacturer's recommended application techniques. Apply curing, curing and sealing compound at consistent time for each pour to maintain close color consistently. Always provide even applications of product.
2. Colored Curing Compound shall be same color as the colored concrete admixture.
3. Precautions shall be taken in hot weather to prevent plastic cracking resulting from excessively rapid drying at surface as described in CIP 5 Plastic Shrinkage Cracking published by the National Ready Mix Concrete Association.
4. Do not cover concrete with plastic sheeting.
5. Take care with any curing paper and provide mock-ups before concrete is placed curing papers should be preplanned
6. Never over apply cures. The use of a small rope with the approximate SF to check coverage is recommended.
7. Use experienced finishers to cure decorative concrete Reference
   ACI 305
   ACI 306
   ACI 308
   ACI 310

7.3 TOLERANCES

As with any natural material, some variation in appearance is a normal design feature of concrete, whether colored or not. It is normal for the color of concrete to lighten as it cures; allow up to 28 days for process to occur.

- Minor variations in appearance of colored concrete, which are similar to natural variations in color and appearance of uncolored concrete are acceptable.
- Reference ACI 116 Terminology "concrete architectural--- concrete that will be permanently exposed to view and therefore requires special care in selection of the concrete materials, forming, placing, and finishing obtaining the desired architectural appearance."
- Final topical sealing of concrete will darken appearance.

APPLICATORS

For a list of qualified contractors, check job references, ACI certified flatwork finishers or contact your local:

ACI Chapter
Kansas City - Concrete Promotional Group of Kansas City
Missouri- Missouri concrete association & Concrete Promotional Group of the Ozarks Kansas – Kansas Ready Mixed Concrete Association
MCIB Midwest Concrete Industry Board ASCC Decorative Concrete Council

REFERENCES
Other useful publications about colored concrete include:

1. PCA PA124 – Finishing Concrete Slabs with Color and Texture
2. PCA SP021 – Color and Texture in Architectural Concrete
3. ASCC Guidelines for Colored Concrete
4. ACI 310 Guideline for Decorative Concrete

American Concrete Institute (ACI)

- ACI 301 “Specifications for Structural Concrete for Buildings”
- ACI 302IR “Recommended Practice for Concrete Floor and Slab Construction.
- ACI 303.1 Standard Specification for Cast-In-Place Architectural Concrete
- ACI 304 Recommended Practices for Measuring, Mixing, Transporting and Placing of Concrete.
- ACI 305R Recommended Practice for Hot Weather Concreting
- ACI 306R Recommended Practice for Cold Weather Concreting
- ACI 360 Design of slabs
- ACI E 703 Slabs on Ground

American Society for Testing and Materials (ASTM)

- ASTM C309 Liquid Membrane-Forming Compounds for Curing Concrete
- ASTM C 1315
- ASTM C494 Standard Specification for Chemical Admixtures for Concrete
- ASTM C979 Standard Specification for Pigments for Integrally Colored Concrete
- ASTM C 31 Standard test for making cylinders
- ASTM C 231 Standard test for air content/pressure
- ASTM C 143 Standard test for slump of concrete
- ASTM C 1064 Standard test for temperature of concrete
- ASTM C 138 Standard test for unit weight

End of Section 311100

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Clay face brick veneer.
   2. Mortar and grout.
   3. Ties and anchors.
   4. Embedded flashing.
   5. Miscellaneous masonry accessories.

B. Products Installed but not Furnished under This Section:
   1. Steel lintels in unit masonry.
   2. Steel shelf angles for supporting unit masonry.
   3. Cavity wall insulation.

C. Related Requirements:
   1. Section 072100 "Thermal Insulation" for cavity wall insulation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each type and color of the following:

   1. Clay face brick, in the form of straps of five or more bricks.
   2. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Material Certificates: For each type and size of the following:

   1. Masonry units.

      a. Include data on material properties.
      b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.

c. For exposed brick, include test report for efflorescence according to ASTM C67.
d. For surface-coated brick, include test report for durability of surface appearance after 50 cycles of freezing and thawing according to ASTM C67.

2. Mortar admixtures.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Anchors, ties, and metal accessories.

C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build a mockup for typical exterior wall in sizes approximately 4 feet long by 6 feet high by full thickness, including full exterior wall assembly.

a. Include a sealant-filled joint at least 16 inches (400 mm) long in mockup.
b. Include a storefront opening showing brick return, lintel, and related flashing
c. Include through-wall flashing installed for a 24-inch (600-mm) length in corner of exterior wall mockup approximately 16 inches (400 mm) down from top of mockup, with a 12-inch (300-mm) length of flashing left exposed to view (omit masonry above half of flashing).
d. Include metal studs, sheathing, water-resistive barrier air barrier, veneer anchors, flashing, cavity drainage material, and weep holes in exterior masonry-veneer wall mockup.

2. Clean exposed faces of mockups with masonry cleaner as indicated.
3. Protect accepted mockups from the elements with weather-resistant membrane.
4. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.

a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

D. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work and will be within 20 feet vertically and horizontally of a walking surface.

2.3 BRICK

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.

B. Clay Face Brick: Facing brick complying with ASTM C216.

1. Basis-of-Design Product: **Yankee Hill “Dark Iron Spot Velour” or “Charcoal Velour”, Utility size brick, 4x4x12 nominal, color to be confirmed from samples AND Mock-up.**
2. Grade: SW.
3. Type: FBX.

4. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3350 psi.
5. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C67.
6. Efflorescence: Provide brick that has been tested according to ASTM C67 and is rated "not effloresced."
7. Size (Actual Dimensions): 3-5/8 inches wide by 3-5/8 inches high by 11-5/8 inches long.
8. Application: Use where brick is exposed unless otherwise indicated.

2.4 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Colored Cement Products for Brick Veneer: Packaged blend made from portland cement and hydrated lime or masonry cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Colored Portland Cement-Lime Mix: Provide Promix Custom Colored Mortar, **color to be determined.**
2. Formulate blend as required to produce color indicated.
3. Pigments shall not exceed 10 percent of portland cement by weight.

E. Aggregate for Mortar: ASTM C144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

F. Aggregate for Grout: ASTM C404.

G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

H. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.

I. Water: Potable.

2.5 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
   1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A153/A153M, Class B-2 coating.
   2. Galvanized-Steel Sheet: ASTM A653/A653M, Commercial Steel, G60 zinc coating.
   3. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Corrugated-Metal Ties: Metal strips not less than 7/8 inch wide with corrugations having a wavelength of 0.3 to 0.5 inch and an amplitude of 0.06 to 0.10 inch made from 0.030-inch- thick steel sheet, galvanized after fabrication.

D. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

   1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- diameter, hot-dip galvanized steelwire.
   2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- 0.25-inch- diameter, hot-dip galvanized steel wire.

E. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

   1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch- (1.52-mm-) thick steel sheet, galvanized after fabrication.

      a. 0.064-inch- thick, galvanized-steel sheet may be used at interior walls unless otherwise indicated.

   2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- diameter, hot-dip galvanized steel wire

F. Partition Top Anchors: 0.105-inch- thick metal plate with a 3/8-inch- diameter metal rod 6 inches long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

G. Adjustable Masonry-Veneer Anchors:

   1. Basis-of-Design Product: Provide the following product or a substitution approved during bidding:

      a. Hohmann & Barnard, Inc. model #BL-407 w/VBT

   2. General: Provide anchors that allow vertical adjustment but resist a 100-lbf (445-N) load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch (1.5 mm).

3. Screw-Attached, Masonry-Veneer Anchors: Wire tie and a rib-stiffened, sheet metal anchor section with screw holes top and bottom, with a projecting vertical tab having a slotted hole for inserting wire tie.
4. Fabricate wire ties from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized-steel wire unless otherwise indicated.
5. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 (4.83-mm) diameter by length required to penetrate steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours according to ASTM B117.

2.6 EMBEDDED FLASHING MATERIALS

A. Flexible Flashing: Use the following unless otherwise indicated:

1. Self-Adhering Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.040 inch (1.02 mm).

a. Manufacturers: Subject to compliance with requirements, provide the following product or a substitution approved during bidding:

1) Hohmann & Barnard, Inc., “Textroflash Flashing”.

b. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

B. Application: Unless otherwise indicated, use the following:

1. Where flexible flashing is indicated to terminate at the wall face, use flexible flashing with a metal drip edge.
2. Where flashing is fully concealed, use flexible flashing.

C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

D. Termination Bars for Flexible Flashing: Stainless steel bars 1/8 inch by 1 inch (3 mm by 25 mm).

1. Manufacturers: Subject to compliance with requirements, provide the following product or a substitution approved during bidding:

a. Hohmann & Barnard, Inc., “T1-Termination Bar”.

E. Metal Drip Edge for Flexible Flashing: Stainless steel factory formed drip with hemmed edge.

1. Manufacturers: Subject to compliance with requirements, provide the following product or a substitution approved during bidding:

a. Hohmann & Barnard, Inc., “DP-Drip Plate”.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

D. Weep/Cavity Vent Products: Use the following unless otherwise indicated:

1. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe; in color selected from manufacturer's standard.

2. Manufacturers: Subject to compliance with requirements, provide the following product or a substitution approved during bidding:

a. Mortar Net Solutions., “WeepVent”.

E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Configuration: Strips, full depth of cavity and 10 inches (250 mm) high, with dovetail-shaped notches 7 inches (175 mm) deep that prevent clogging with mortar droppings

2. Manufacturers: Subject to compliance with requirements, provide the following product or a substitution approved during bidding:

a. Mortar Net Solutions., “MortarNet”.

2.8 MASONRY CLEANERS

A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2.9 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime mortar.

4. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Pigmented Mortar: Use colored cement product.

1. Application: Use pigmented mortar for exposed mortar joints with the following units:

a. Clay face brick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. Verify that foundations are within tolerances specified.
2. Verify that substrates are free of substances that impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.

B. Build chases and recesses to accommodate items specified in this and other Sections.

C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet , or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet , 1/4 inch in 20 feet (, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet , 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch . Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.

C. Bond Pattern for Face Brick: Unless otherwise indicated, lay face brick in a 1/3 running bond pattern. Do not use units with less than a nominal 4-inch horizontal face dimension at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

A. Lay as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.

B. Lay solid masonry units and hollow brick with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 ANCHORED MASONRY VENEERS

A. Anchor masonry veneers to wall framing and concrete backup with masonry-veneer anchors to comply with the following requirements:

1. Fasten screw-attached anchors through sheathing to wall framing and to concrete backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
2. Embed tie sections in masonry joints.
3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
4. Space anchors as indicated, but not more than 18 inches o.c. vertically and 24 inches o.c. horizontally, with not less than one anchor for each 2 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches, around perimeter.
5. Space anchors as indicated, but not more than 16 inches o.c. vertically and 25 inches o.c. horizontally, with not less than one anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.
6. Space anchors as indicated, but not more than 18 inches o.c. vertically and horizontally. Install additional anchors within 12 inches of openings and at intervals, not exceeding 24 inches, around perimeter.

B. Provide not less than 2 inches of airspace between back of masonry veneer and face of insulation.

1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.

3.7 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form expansion joints in brick as follows:

1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
2. Build flanges of factory-fabricated, expansion-joint units into masonry.
3. Build in compressible joint fillers where indicated.
4. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."

C. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than 3/8 inch .

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.8 LINTELS

A. Install steel lintels where indicated.

3.9 FLASHING, WEEP HOLES, AND CAVITY VENTS

A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At masonry-veneer walls, extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 8 inches (200 mm); with upper edge tucked under air barrier, lapping at least 4 inches (100 mm). Fasten upper edge of flexible flashing to sheathing through termination bar.

3. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
4. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.

C. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.

1. Use specified weep/cavity vent products to form weep holes.
2. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.

D. Place cavity drainage material in airspace behind veneers to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

E. Install cavity vents in head joints in exterior wythes at spacing indicated. Use specified weep/cavity vent products to form cavity vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.10 FIELD QUALITY CONTROL

A. Clay Masonry Unit Test: For each type of unit provided, according to ASTM C67 for compressive strength.

B. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.

C. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for mortar air content and compressive strength.

D. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.

E. Prism Test: For each type of construction provided, according to ASTM C1314 at 7 days and at 28 days.

3.11 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

3.12 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
3. Do not dispose of masonry waste as fill within 18 inches of finished grade.

C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Field-installed shear connectors.
3. Grout.

B. Related Requirements:

1. Section 051213 "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
2. Section 053100 "Steel Decking" for field installation of shear connectors through deck.
3. Section 055000 "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame miscellaneous steel fabrications and other steel items not defined as structural steel.
4. Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" for surface-preparation and priming requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Identify members and connections of the Seismic-Load-Resisting System.
6. Indicate locations and dimensions of protected zones.
7. Identify demand critical welds.

C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand critical welds.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For installer and fabricator.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Shop primers.
6. Nonshrink grout.

F. Survey of existing conditions.

G. Source quality-control reports.

H. Field quality-control and special inspection reports.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector.

C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

D. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 360.
3. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M.

B. Channels, Angles-Shapes: ASTM A 572/A 572M, Grade 50.

C. Plate and Bar: ASTM A 572/A 572M, Grade 50.

D. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588/A 588M, Grade 50.

E. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade C, structural tubing.

F. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts **or tension-control, bolt-nut-washer assemblies with splined ends**; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.

C. Direct-Tension Indicators: ASTM F 959, Type 490, compressible-washer type with plain finish.Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip zinc coating.
2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.

D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

1. Finish: Plain.

E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

F. Unheaded Anchor Rods: ASTM F 1554, Grade 55, weldable.

1. Configuration: Straight.
2. Nuts: ASTM A 563 hex carbon steel.
3. Plate Washers: ASTM A 36/A 36M carbon steel.
4. Washers: ASTM F 436, Type 1, hardened carbon steel.
5. Finish: Plain.

G. Headed Anchor Rods: ASTM F 1554, Grade 55, weldable, straight.

1. Nuts: ASTM A 563 hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436, Type 1, hardened carbon steel.
4. Finish: Plain.

H. Threaded Rods: ASTM A 572/A 572M, Grade 50.

1. Nuts: ASTM A 563 hex carbon steel.
2. Washers: ASTM F 436, Type 1, hardened carbon steel.
3. Finish: Plain.

I.

2.3 PRIMER

A. Primer: Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

B. Galvanizing Repair Paint: ASTM A 780/A 780M.

2.4 GROUT

A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 1, "Solvent Cleaning."

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural-steel frame. Straighten as required to provide uniform, square, and true members in completed wall framing. Build up welded framing, weld exposed joints continuously, and grind smooth.

H. Welded Door Frames: Build up welded door frames attached to structural-steel frame. Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated.

I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.6 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.
6. Surfaces enclosed in interior construction.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
5. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
7. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
9. SSPC-SP 8, "Pickling."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.8 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
2. Galvanize lintels, shelf angles, and welded door frames attached to structural-steel frame and located in exterior walls.

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.
2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

    a. Liquid Penetrant Inspection: ASTM E 165.
    b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
    c. Ultrasonic Inspection: ASTM E 164.
    d. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

3.6 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

D. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

END OF SECTION 051200

SECTION 052100 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. K-series steel joists.
2. Joist accessories.

B. Related Requirements:
1. Section 051200 "Structural Steel Framing" for field-welded shear connectors.

1.3 DEFINITIONS

A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of joist, accessory, and product.

B. Shop Drawings:

1. Include layout, designation, number, type, location, and spacing of joists.
2. Include joining and anchorage details; bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.
3. Indicate locations and details of bearing plates to be embedded in other construction.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer and professional engineer.

B. Welding certificates.

C. Manufacturer certificates.

D. Mill Certificates: For each type of bolt.

E. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.

F. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.

1. Use ASD; data are given at service-load level.
2. Design special joists to withstand design loads with live-load deflections no greater than the following:
   a. Roof Joists: Vertical deflection of 1/360of the span.

2.2 K-SERIES STEEL JOISTS

A. Manufacture steel joists of type indicated according to "Standard Specification for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.

1. Joist Type: K-series steel joists.

B. Provide holes in chord members for connecting and securing other construction to joists.

C. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."

D. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."

E. Do not camber joists.

F. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.3 PRIMERS

A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

B. Primer: Provide shop primer that complies with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

2.4 JOIST ACCESSORIES

A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.

B. Bridging: Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.

C. Bridging: Fabricate as indicated and according to SJI's "Specifications."Furnish additional erection bridging if required for stability.

D. Fabricate steel bearing plates from ASTM A 36/A 36M steel with integral anchorages of sizes and thicknesses indicated. Shop prime paint.

E. Steel bearing plates with integral anchorages are specified in Section 055000 "Metal Fabrications."

F. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Plain.

G. Welding Electrodes: Comply with AWS standards.

H. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

I. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.5 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2.

B. Do not prime paint joists and accessories to receive sprayed fire-resistive materials.

C. Apply one coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

D. Shop priming of joists and joist accessories is specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written instructions, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads are applied.

C. Field weld joists to supporting steel bearing plates. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Bolt joists to supporting steel framework using carbon-steel bolts.

E. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.

F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test field welds according to AWS D1.1/D1.1M and the following procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165/E 165M.
b. Magnetic Particle Inspection: ASTM E 709.
c. Ultrasonic Testing: ASTM E 164.
d. Radiographic Testing: ASTM E 94.

C. Visually inspect bolted connections.

D. Prepare test and inspection reports.

3.4 PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel, and accessories.

1. Clean and prepare surfaces by hand-tool cleaning according to SSPC-SP 2 or power-tool cleaning according to SSPC-SP 3.
2. Apply a compatible primer of same type as primer used on adjacent surfaces.

C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

END OF SECTION 052100

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof deck.
2. Acoustical roof deck.

B. Related Requirements:
1. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.
2. Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
3. Section 099113 "Exterior Painting" for repair painting of primed deck and finish painting of deck.
4. Section 099123 "Interior Painting" for repair painting of primed deck and finish painting of deck.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of deck, accessory, and product indicated.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Power-actuated mechanical fasteners.
2. Acoustical roof deck.

D. Evaluation Reports: For steel deck, from ICC-ES.

E. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

C. Electrical Raceway Units: Provide UL-labeled cellular floor-deck units complying with UL 209 and listed in UL's "Electrical Construction Equipment Directory" for use with standard header ducts and outlets for electrical distribution systems.

D. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ROOF DECK

A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 G90 zinc coating.
2. Deck Profile: As indicated.
3. Cellular Deck Profile: As indicated, with bottom plate.
4. Profile Depth: As indicated.
5. Design Uncoated-Steel Thickness: As indicated.

6. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated.
7. Span Condition: Triple span or more.
8. Side Laps: Manufacturer recommendation.

2.3 ACOUSTICAL ROOF DECK

A. Acoustical Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 G90 zinc coating.
2. Deck Profile: As indicated.
3. Cellular Deck Profile: As indicated, with bottom plate.
4. Profile Depth: As indicated.
5. Design Uncoated-Steel Thickness: As indicated.
6. Design Uncoated-Steel Thicknesses; Deck Unit/Bottom Plate: As indicated.
7. Span Condition: Triple span or more.
8. Side Laps: Manufacturer recommendation.
9. Acoustical Perforations: Deck units with manufacturer's standard perforated vertical webs
10. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip of glass or mineral fiber.

    a. Factory install sound-absorbing insulation into cells of cellular deck.
    b. Installation of sound-absorbing insulation is specified in Section 07 21 00 “Thermal and Acoustical Insulation.”

11. Acoustical Performance: NRC 0.90, tested according to ASTM C 423.

2.4 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile indicated.

G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

H. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

I. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch- wide flanges and level recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.

J. Galvanizing Repair Paint: ASTM A 780/A 780M.

K. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members as indicated on drawings.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, as indicated on drawings.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:

1. End Joints: Lapped 2 inches minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

G. Sound-Absorbing Insulation: Installation into topside ribs of deck as specified in Section 07 21 00 “Thermal and Acoustical Insluation.”

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

C. Prepare test and inspection reports.

3.5 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

C. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

END OF SECTION 053100

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Load-bearing wall framing.
2. Exterior non-load-bearing wall framing.
3. Interior non-load-bearing wall framing exceeding height limitations of standard, nonstructural metal framing.
4. Soffit framing.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for miscellaneous steel shapes, masonry shelf angles, and connections used with cold-formed metal framing.
2. Section 092216 "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with height limitations and ceiling-suspension assemblies.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

C. Delegated-Design Submittal: For cold-formed steel framing.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Welding certificates.

C. Product Certificates: For each type of code-compliance certification for studs and tracks.

D. Product Test Reports: For each listed product, for tests performed by manufacturer and witnessed by a qualified testing agency.

1. Steel sheet.
2. Expansion anchors.
3. Power-actuated anchors.
4. Mechanical fasteners.
5. Vertical deflection clips.
6. Horizontal drift deflection clips
7. Miscellaneous structural clips and accessories.

E. Evaluation Reports: For nonstandard cold-formed steel framing post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.

C. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Steel Stud Manufacturers Association].

D. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer licensed in the State of Missouri, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.

B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.

1. Design Loads: As indicated on Drawings.
2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

    a. Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/600of the wall height.
    b. Interior Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft..
    c. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/600 of the wall height.
    d. Interior Non-Load-Bearing Framing: Horizontal deflection of 1/360 of the wall height under a horizontal load of 5 lbf/sq. ft..

3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

    a. Upward and downward movement of 1 inch.

5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

C. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:

1. Floor and Roof Systems: AISI S210.
2. Wall Studs: AISI S211.
3. Headers: AISI S212.
4. Lateral Design: AISI S213.

D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.2 COLD-FORMED STEEL FRAMING MATERIALS

A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:

1. Grade: As required by structural performance.
2. Coating: G60.

B. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: As required by structural performance.
2. Coating: G60.

2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch.
2. Flange Width: 1-3/8 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.
2. Flange Width: 1-1/4 inches.

C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 1 inch plus the design gap for one-story structures and 1 inch plus twice the design gap for other applications.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

    a. Minimum Base-Metal Thickness: 0.0329 inch.
    b. Flange Width: 1 inch plus the design gap for one-story structures and 1 inch plus twice the design gap for other applications.

2. Inner Track: Of web depth indicated, and as follows:

    a. Minimum Base-Metal Thickness: 0.0428 inch.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.4 INTERIOR NON-LOAD-BEARING WALL FRAMING

A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch.
2. Flange Width: 1-3/8 inches.

B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: Matching steel studs.
2. Flange Width: 1-1/4 inches.

C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.

D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

1. Minimum Base-Metal Thickness: 0.0428 inch.
2. Flange Width: 1 inch plus the design gap for one-story structures and 1 inch plus twice the design gap for other applications.

E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.

1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:

    a. Minimum Base-Metal Thickness: 0.0329 inch.
    b. Flange Width: 1 inch plus the design gap for one-story structures and 1 inch plus twice the design gap for other applications.

2. Inner Track: Of web depth indicated, and as follows:

    a. Minimum Base-Metal Thickness: 0.0428 inch.

F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 SOFFIT FRAMING

A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: 0.0329 inch.
2. Flange Width: 1-5/8 inches, minimum.

2.6 FRAMING ACCESSORIES

A. Fabricate steel-framing accessories from ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.

B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

1. Supplementary framing.
2. Bracing, bridging, and solid blocking.
3. Web stiffeners.
4. Anchor clips.
5. End clips.
6. Foundation clips.
7. Gusset plates.
8. Stud kickers and knee braces.
9. Joist hangers and end closures.
10. Hole-reinforcing plates.
11. Backer plates.

2.7 ANCHORS, CLIPS, AND FASTENERS

A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.

B. Anchor Bolts: ASTM F 1554, Grade 55, threaded carbon-steel hex-headed bolts carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153/A 153M, Class C.

C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC193, ICC-ES AC58, or ICC-ES AC308 as appropriate for the substrate.

1. Uses: Securing cold-formed steel framing to structure.
2. Type: Torque-controlled expansion anchor, Torque-controlled adhesive anchor, or adhesive anchor.
3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 , Class Fe/Zn 5, unless otherwise indicated.

D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.

1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

F. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

A. Galvanizing Repair Paint: ASTM A 780/A 780M.

B. Cement Grout: Portland cement, ASTM C 150/C 150M, Type I; and clean, natural sand, ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C 1107/C 1107M, and with a fluid consistency and 30-minute working time.

D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.

E. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

2.9 FABRICATION

A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.

1. Fabricate framing assemblies using jigs or templates.
2. Cut framing members by sawing or shearing; do not torch cut.
3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.

    a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    b. Locate mechanical fasteners and install according to Shop Drawings, with screws penetrating joined members by no fewer than three exposed screw threads.

4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.

C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable variation of 1/8 inch in 10 feet and as follows:

1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, conditions, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.

B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that required to obtain fire-resistance ratings indicated. Protect remaining fire-resistive materials from damage.

C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.

D. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.

B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.

C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.

D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.

1. Cut framing members by sawing or shearing; do not torch cut.
2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.

a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

b. Locate mechanical fasteners, install according to Shop Drawings, and comply with requirements for spacing, edge distances, and screw penetration.

E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

F. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.

G. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

H. Install insulation, specified in Section 072100 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.

I. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: As indicated on Drawings.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to studs and anchor to building structure.
4. Connect drift clips to cold-formed steel framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at 96-inch centers.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 INTERIOR NON-LOAD-BEARING WALL INSTALLATION

A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.

B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:

1. Stud Spacing: 16 inches.

C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.

D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.

1. Install single deep-leg deflection tracks and anchor to building structure.
2. Install double deep-leg deflection tracks and anchor outer track to building structure.
3. Connect vertical deflection clips to studs and anchor to building structure.
4. Connect drift clips to cold-formed steel metal framing and anchor to building structure.

E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.

1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.

F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.

1. Install solid blocking at 96-inch.

G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.6 ERECTION TOLERANCES

A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.7 FIELD QUALITY CONTROL

A. Testing: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Field and shop welds will be subject to testing and inspecting.

C. Testing agency will report test results promptly and in writing to Contractor and Architect.

D. Cold-formed steel framing will be considered defective if it does not pass tests and inspections.

E. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 REPAIRS AND PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel framing and supports for ceiling-hung toilet compartments.
2. Steel framing and supports for operable partitions.
3. Steel framing and supports for countertops.
4. Steel tube reinforcement for low partitions.
5. Steel framing and supports for mechanical and electrical equipment.
6. Steel framing and supports for applications where framing and supports are not specified in other Sections.
7. Shelf angles.
8. Metal ladders.
9. Miscellaneous steel trim including steel angle corner guards
10. Metal bollards.
11. Metal downspout boots.
12. Loose bearing and leveling plates for applications where they are not specified in other Sections.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
2. Section 051200 "Structural Steel Framing."

1.3 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Nonslip aggregates and nonslip-aggregate surface finishes.
2. Prefabricated building columns.
3. Metal nosings and treads.
4. Paint products.
5. Grout.

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Steel framing and supports for ceiling-hung toilet compartments.
2. Steel framing and supports for operable partitions.
3. Steel framing and supports for overhead doors.
4. Steel framing and supports for countertops.
5. Steel tube reinforcement for low partitions.
6. Steel framing and supports for mechanical and electrical equipment.
7. Steel framing and supports for applications where framing and supports are not specified in other Sections.
8. Steel girders for supporting wood frame construction.
9. Steel pipe columns for supporting wood frame construction.
10. Shelf angles.
11. Metal ladders.
12. Ladder safety cages.
13. Structural-steel door frames.
14. Metal bollards.
15. Loose steel lintels.

C. Delegated-Design Submittal: For ladders , including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Mill Certificates: Signed by stainless-steel manufacturers, certifying that products furnished comply with requirements.

C. Welding certificates.

D. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

E. Research/Evaluation Reports: For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.7 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.

B. Structural Performance of Aluminum Ladders: Aluminum ladders shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Stainless-Steel Sheet, Strip, and Plate: ASTM A 240/A 240M or ASTM A 666, Type 304.

D. Stainless-Steel Bars and Shapes: ASTM A 276.

E. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

F. Rolled-Stainless-Steel Floor Plate: ASTM A 793.

G. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

H. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.

I. Zinc-Coated Steel Wire Rope: ASTM A 741.

1. Wire-Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.

J. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.

1. Size of Channels: 1-5/8 by 1-5/8 inches .
2. Material: Galvanized steel, ASTM A 653/A 653M, with G90 coating; 0.108-inch nominal thickness.
3. Material: Cold-rolled steel, ASTM A 1008/A 1008M,; 0.0966-inch minimum thickness; hot-dip galvanized after fabrication.

K. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

L. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.

M. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

N. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

O. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

P. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500.

Q. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

2.3 FASTENERS

A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

1. Provide stainless-steel fasteners for fastening aluminum.
2. Provide stainless-steel fasteners for fastening stainless steel.
3. Provide stainless-steel fasteners for fastening nickel silver.
4. Provide bronze fasteners for fastening bronze.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.

C. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 325, Type 3; with hex nuts, ASTM A 563, Grade C3; and, where indicated, flat washers.

D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.

1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

E. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488/E 488M, conducted by a qualified independent testing agency.

F. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

G. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.

H. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting," Section 099123 Interior Painting," and Section 099600 "High-Performance Coatings."

B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.

C. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.

D. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

E. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

F. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

G. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

H. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

I. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 4000 psi.

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

D. Form exposed work with accurate angles and surfaces and straight edges.

E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.

1. Fabricate units from slotted channel framing where indicated.
2. Furnish inserts for units installed after concrete is placed.

C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as recommended by partition manufacturer. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.

D. Galvanize miscellaneous framing and supports where indicated.

E. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.7 SHELF ANGLES

A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.

B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.

C. Galvanize and prime shelf angles located in exterior walls.

D. Prime shelf angles located in exterior walls with zinc-rich primer.

E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.8 METAL LADDERS

A. General:

1. Comply with ANSI A14.3.
2. For elevator pit ladders, comply with ASME A17.1/CSA B44.

B. Steel Ladders:

1. Space siderails 16 inches apart unless otherwise indicated.
2. Siderails: Continuous, 1/2-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 3/4-inch deformed steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.

5. Provide nonslip surfaces on top of each rung, either by coating rung with aluminum-oxide granules set in epoxy-resin adhesive or by using a type of manufactured rung filled with aluminum-oxide grout.
6. Provide nonslip surfaces on top of each rung by coating with abrasive material metallically bonded to rung.

7. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 1/2 inch in least dimension.
8. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
9. Galvanize exterior ladders, including brackets.
10. Prime ladders, including brackets and fasteners, with zinc-rich primer.

2.9 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize and prime exterior miscellaneous steel trim.

D. Prime exterior miscellaneous steel trim with zinc-rich primer.

2.10 METAL BOLLARDS

A. Fabricate metal bollards from Schedule 40 steel pipe.

1. Fill bollards with concrete and dome at top.

B. Fabricate sleeves for bollard anchorage from steel pipe or tubing with 1/4-inch- thick steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches deep and 3/4 inch larger than OD of bollard.

C. Fabricate internal sleeves for removable bollards from Schedule 40 steel pipe or 1/4-inch wall-thickness steel tubing with an OD approximately 1/16 inch less than ID of bollards. Match drill sleeve and bollard for 3/4-inch steel machine bolt.

D. Provide galvanized bollards, shop prime with galvanized compatible primer, prepped for field painting.

2.11 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize plates.

C. Prime plates with zinc-rich primer.

2.12 LOOSE STEEL LINTELS

A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.

B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 8 inches unless otherwise indicated.

C. Galvanize and prime loose steel lintels located in exterior walls.

D. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.13 STEEL WELD PLATES AND ANGLES

A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.14 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.15 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.

C. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

1. Shop prime with universal shop primer unless zinc-rich primer is indicated.

D. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:

1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
4. Other Items: SSPC-SP 3, "Power Tool Cleaning."

E. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

2.16 ALUMINUM FINISHES

A. As-Fabricated Finish: AA-M12.

B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.

E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

1. Cast Aluminum: Heavy coat of bituminous paint.

2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for ceiling hung toilet partitions, operable partitions, overhead doors, and overhead grilles securely to, and rigidly brace from, building structure.

C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

3.3 INSTALLING METAL BOLLARDS

A. Anchor bollards to existing construction with expansion anchors . Provide four 3/4-inch bolts at each bollard unless otherwise indicated.

1. Embed anchor bolts at least 4 inches in concrete.

B. Anchor bollards in place with concrete footings as detailed. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

C. Fill bollards solidly with concrete, mounding top surface to shed water.

1. Do not fill removable bollards with concrete.

3.4 INSTALLING BEARING AND LEVELING PLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.

B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting." and Section 099123 "Interior Painting."

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055000

SECTION 057000 - DECORATIVE METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Center pivot steel doors with expanded metal mesh screen and hardware.

B. Related Requirements:

1. Section 055000 “Metal Fabrications”.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including finishing materials.

B. Shop Drawings: Show fabrication and installation details for decorative metal.

1. Indicate materials, finishes, fasteners, anchorages, and accessory items.
2. Indicate edge cut edges of panels and location of heat marks.

C. Samples: For each type of exposed material, finish, weld and fastener.

D. Mock ups: Provide 2’x2’ finished corner mockup with full range of material characteristics to include welded seams and power coated finish.

PART 2 - PRODUCTS

2.1 DECORATIVE METAL FABRICATORS

A. Fabricator: Subject to compliance with requirements, available fabricators offering products that may be incorporated into the Work include, but are not limited to, the following:

1. SSM (Standard Sheet Metal), 405 North Olive Street, Kansas City, MO 64120, 816.221.5424, www.standardsheetmetal.com.
2. Other fabricators as approved by architect.

2.2 STEEL

A. Tubing: ASTM A500/A500M (cold formed) or ASTM A513, Type 5 (mandrel drawn).

B. Bars: Hot-rolled, carbon steel complying with ASTM A29/A29M, Grade 1010.

C. Plates, Shapes, and Bars: ASTM A36/A36M.

2.3 EXPANDED METAL GRATING

A. Product: As indicated on the drawings.

B. Grind sharp edges smooth as required as grating will be touched by users.

2.4 HARDWARE

A. Center Pivots: Heavy duty as required for weight of doors and performance criteria of centering divot feature at every 90 degrees. Integrate into frame and reinforce as required.

1. Manufacturer: Similar to Rixson 128-3/4 Pivot Set but with centering feature.

B. Dust proof strike recessed into concrete floor and surface mounted cane bolts as indicated on drawings. Finish to match metal frame.

2.5 FABRICATION, GENERAL

A. Form decorative metal to required shapes and sizes, true to line and level with true curves and accurate angles and surfaces. Finish exposed surfaces to smooth, sharp, well-defined lines and arris.

B. Mill joints to a tight, hairline fit. Cope or miter corner joints. Weld and grind smooth.

C. Comply with AWS for recommended practices in shop. Cut finished surfaces without distorting or discoloring exposed side. Clean and dress exposed edges and contact surfaces.

D. Comply with AWS for recommended practices in shop welding and brazing. Weld and braze behind finished surfaces without distorting exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.

1. Where welding and brazing cannot be concealed behind finished surfaces, finish joints to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 Welds: no evidence of a welded joint.

2.6 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2.7 STEEL FINISHES

A. Preparing Nongalvanized Items for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning.”

B. Primer Application: Apply shop primer to prepared surfaces of items unless otherwise indicated. Primer need not be applied to surfaces to be embedded in concrete or masonry.
   1. Shop prime uncoated ferrous-metal surfaces with [universal shop primer] [primers specified in Section 099113 "Exterior Painting."] [primers specified in Section 099123 "Interior Painting."] unless [zinc-rich primer is] [primers specified in Section 099600 "High-Performance Coatings" are] indicated.
   2. Do not apply primer to galvanized surfaces.

C. Powder-Coat Finish: Prepare, treat, and coat nongalvanized ferrous metal to comply with resin manufacturer's written instructions and as follows:
   1. Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
   2. Treat prepared metal with iron-phosphate pretreatment, rinse, and seal surfaces.
   3. Apply thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils (0.04 mm).
   4. Color: Match Architect's sample.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Set products accurately in location, alignment, and elevation, measured from established lines and levels.

B. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.

C. Restore protective coverings that have been damaged during shipment or installation. Remove protective coverings only when there is no possibility of damage from other work.

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

END OF SECTION 057000

SECTION 057313 - GLAZED DECORATIVE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior structural laminated glass railings at security gates.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Metal support base channel.
2. Glass products.
3. Glazing cement and accessories for structural glass railings.
4. Sealant and accessories for structural glass railings.
5. Fasteners.
6. Anchoring cement.

B. Shop Drawings: Include plans, elevations, sections, and attachment details.

C. Samples: For each type of exposed finish required.

1. Metal base support.
2. Laminated glass.
3. Metal glass edge protection.

1.4 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For tests performed by a qualified testing agency, in accordance with ASTM E894, ASTM E935, ASTM E2353, and ASTM E2358.

B. Research reports.

C. Preconstruction test reports.

1.5 WARRANTY

A. Manufacturer's Special Warranty for Laminated Glass: Glazed decorative metal railing manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Glass railing ase Rail system as manufactured by Viewrail, 1755 Ardmore Court, Goshen, IN 46526 (www.viewrail.com). Additional acceptable manufactures include:

1. C.R. Laurence Co., 2503 East Vernon Avenue, Los Angeles, CA 90058, 800.421.6144 Ext 17780. (www.crl-arch.com). CRL GRS TAPER-LOC® Dry Glaze Tempered Laminated Glass Guard Rail System.
2. VIVA Railings, LLC, 1454 Halsey Way, Carrollton TX 75007, 972.353.8482 (www.vivarailings.com), SHOE™ Aluminum Glass Railing System.

B. Product Options: Information on Drawings and in the Specifications establishes requirements for railing system's aesthetic effects and performance characteristics.

1. Support shall be a continuous channel base system.
2. Stainless steel base with stainless steel endcaps.
3. Square stainless-steel glass edge protection on exposed edges (3 sides).
4. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Top rails cap of glass guards:

a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2.3 METALS, GENERAL

A. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.

2.4 STAINLESS STEEL

A. Tubing: ASTM A554, Grade MT 304.

B. Pipe: ASTM A312/A312M, Grade TP 304.

C. Castings: ASTM A743/A743M, Grade CF 8 or Grade CF 20.

D. Sheet, Strip, Plate, and Flat Bar: ASTM A666 or ASTM A240/A240M, Type 304.

E. Bars and Shapes: ASTM A276, Type 304.

2.5 GLASS AND GLAZING PRODUCTS, GENERAL

A. Safety Glazing: Glazing shall comply with 16 CFR 1201, Category II.

B. Safety Glazing Labeling: Permanently mark glass with certification label of the SGCC, another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear), Class 1 and low-iron clear, or Class 2 (tinted) as indicated, Quality-Q3.

D. Sealant and Accessories for Structural Glass Railings: Sealant, gaskets, setting blocks, shims, and related accessories as recommended or supplied by railing manufacturer for installing structural glazing in metal base channels.

E. Glazing Gaskets for Glass-Infill Panels: Glazing gaskets and related accessories as recommended or supplied by railing manufacturer for installing glass-infill panels in post-supported railings.

2.6 GLASS HANDRAILS AND GUARDS

A. Laminated Glass Handrails and Guards: ASTM C1172, Type II with two plies of glass bonded together by an interlayer.

1. Construction: Laminate glass with [polyvinyl butyral interlayer or ionoplast polymer interlayer] to comply with interlayer manufacturer's written instructions.
2. Interlayer Thickness: 0.030 inch (0.76 mm).
3. Kind: LT (laminated tempered).
4. Glass Color: Inner-ply clear; outer-ply clear.
5. Interlayer Color: Clear.
6. Glass Plies for Glass-Infill Panels: Thickness required by structural loads, but not less than ½” total thickness of assemble.
7. Coordinate thickness with manufactures square edge cap.

2.7 FASTENERS

A. Fastener Materials: Unless otherwise indicated, provide the following:

1. Stainless Steel Components: Type 304 stainless steel fasteners.

B. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to design load, in accordance with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or ICC-ES AC308.

2.8 MISCELLANEOUS MATERIALS

A. Glass Edge Trim: Square profile of stainless steel on three sides.

2.9 FABRICATION OF GLASS PANELS

A. Fabricate glass to sizes and shapes required; provide for proper edge clearance and bite on glazing panels.

B. Glass-Infill Panels: Provide laminated, tempered glass-infill panels for straight sections.

1. Edge Finish: Flat-grind edges to produce smooth, square edges with slight chamfers at junctions of edges and faces. Protect with square stainless-steel trim.

2.10 STAINLESS STEEL FINISHES

A. Stainless Steel Sheet, Strip, Plate, and Bar Finishes:

1. Directional Satin Finish: ASTM A480/A480M, No. 4.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Comply with Drawings and manufacturer's written instructions for installing glazed decorative railings, accessories, and other components.

B. Windborne-Debris Resistance: Anchor glazed decorative railings to structure using anchoring method, fastener type, and fastening frequency identical to that used in windborne-debris-resistance testing.

C. Perform cutting, drilling, and fitting required for installing metal railings.

1. Fit exposed connections and trim accessories together to form tight, hairline joints.
2. Set glass raining supports accurately in location, alignment, and elevation; measured from established lines and levels.
3. Set supports plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
4. Align rails so variations from level for horizontal members and variations do not exceed 1/4 inch in 12 feet (5 mm in 3 m).

D. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat concealed surfaces of aluminum and copper alloys that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with shop primer.

E. Property prepare concrete floor and anchor supports as required to meet performance criteria.

3.2 INSTALLATION OF GLASS BALUSTERS

A. Structural Glass Railings: Install assembly to comply with railing manufacturer's written instructions.

B. Floor Base Supported Channels with Glass-Infill Panels:

1. Install assembly to comply with railing manufacturer's written instructions and with requirements in other Part 3 articles.
2. Erect floor supports and other metal railing components and set factory-cut glass-infill panels.
3. Do not cut, drill, or alter glass-infill panels in field. Protect edges from damage.

END OF SECTION 057313

SECTION 060660 – TRANSLUCENT RESIN PANEL FABRICATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the Plastic Fabrication as shown and specified in the described system(s):

1. Suspended Translucent Resin “Airplanes” System.

1.3 SUBMITTALS

A. General: Submit the following in accordance with conditions of contact and Division 1 specification section 01 33 00 “Submittal Procedures”.

B. Product Data: Submit manufacturer’s product data; include product description, fabrication information, and compliance with specified performance requirements.

C. Submit product test reports from a qualified independent 3rd party testing agency indicating each type and class of panel system complies with the project performance requirements, based on comprehensive testing of current products. Previously completed test reports will be acceptable if for current manufacturer and indicative of products used on this project.

1. Test reports required are:
    a. Rate of Burning (ASTM D 635)
    b. Self-Ignition Temperature (ASTM D 1929)
    c. Density of Smoke (ASTM D 2843)
    d. Flame Spread and Smoke Developed testing (ASTM E 84)
    e. Room Corner Burn Test (NFPA 286)
    f. Extent of Burning (UL 94)
    g. Impact strength (ASTM D 3763)
    h. Safety glazing impact resistance (ANSI Z97.1-2004)
    i. UPITT Test for Combustion Product Toxicity
    j. Passes NFPA 269/ASTM1678 for Combustion Product Toxicity
    k. Dynamic environmental testing (ASTM standards D 5116 or D 6670)
    l. UL Yellowcard

D. Building Approvals: Plastic Fabrications are to have been evaluated and must be registered with and comply to requirements of the following jurisdictions:

1. Los Angeles Department of Building and Safety (Product must have a LARR [Los Angeles Research Report] number) for use as Light-transmitting Panels
2. ICC-ES Report for Light Transmitting Plastics and Interior Finishes

E. Shop Drawings: Include plans, elevations, sections, panel dimensions, details, and attachments to other work.

F. Samples for Initial Selection:

1. Submit minimum 2-inch by 2-inch samples. Indicate full color, texture and pattern variation.

G. Samples for Verification:

1. Submit minimum 4-inch by 4-inch sample for each type, texture, pattern and color of solid plastic fabrication.

H. Mockups:

1. Build mockups to verify selections made under sample Submittals and to demonstrate aesthetic effects.
2. Build mockup of each type of Plastic Fabrication.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

I. Maintenance Data: Submit manufacturer's care and maintenance data, including care, repair and cleaning instructions. Include in Project closeout documents.

1.4 QUALITY ASSURANCE

A. Manufacturers Qualifications

1. Materials and systems shall be manufactured by a company continuously and regularly employed in the manufacture of specified materials for a period of at least five (5) consecutive years and which can show evidence of those materials being satisfactorily used on at least six (6) projects of similar size, scope and location. At least three (3) of the projects shall have been successful for use five (5) years or longer.
2. Manufactured panels must be produced from a minimum of 40% pre-consumer recycle content. This recycle content must be certified by a recognized 3rd party certification group, such as Scientific Certification Systems (SCS).
3. Completely PVC – Free product
4. Manufacturer must offer a documented reclaim process that will take back, at the manufacturers cost, panels that are at their end-of life cycle. Return process is preceded by following requirements highlighted in Section 024200 Removal and Salvage of Construction Materials.
5. Manufacturer must have a 3rd party completed Life Cycle Analysis
6. Manufacturer must have an Environmental Product Declaration (EPD).

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver Plastic Fabrications, systems and specified items in manufacturer's standard protective packaging.

B. Do not deliver Plastic Fabrications, system, components and accessories to Project site until areas are ready for installation.

C. Store materials in a flat orientation in a dry place that is not exposed to exterior elements.

D. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent damage or staining following installation for duration of project.

E. Before installing Plastic Fabrications, permit them to reach room temperature.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install Solid Polymer Fabrications until spaces are enclosed and weatherproof, and ambient temperatures and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1.7 WARRANTY

A. Manufacturer's Special Warranty on Plastic Fabrications: Manufacturer's standard form agreeing to repair or replace units that fail in material or workmanship within the specified warranty period.

B. Warranty Period: 1 year after the date of substantial completion.

C. The warranty shall not deprive the owner of other rights or remedies the Owner may have under other provisions of the Contract Documents, and is in addition to and runs concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis of Design Manufacturer: 3form, LLC., Salt Lake City, Utah, USA / telephone 801-649-2500, or approved equal.

2.2 MATERIALS

A. Varia Ecoresin™ Sheet

1. Engineered co-polyester resin produced in the USA
2. Sheet Size: Maximum 4' x 10'
3. Thickness: Minimum 1/16"
4. Basis of Design Product: The design of Plastic Fabrications is based on Varia Ecoresin™ as provided by 3form, LLC. Products from other manufacturers must be approved by the Architect or Designer prior to bidding in accordance with the Instructions to Bidders and Section 10 60 00 "Product Requirements".

B. Interlayer Materials: Compatible with polyesters and bonding process to create a monolithic sheet of material when complete.

C. Sheet minimum performance attributes:

1. Rate of Burning (ASTM D 635). Material must attain CC1 Rating for a nominal thickness of 1.5 mm (0.060 in.) and greater.
2. Self-Ignition Temperature (ASTM D 1929). Material must have a Self-ignition temperature greater than 650°F.
3. Density of Smoke (ASTM D 2843). Material must have a smoke density less than 75%.
4. Flame spread and Smoke developed testing (ASTM E 84). Material must be able to meet a level of Class A (Flame spread less than 25 and smoke less than 450) at thickness of 1/8",3/16" and 1".
5. Room Corner Burn Test (NFPA 286). Material must meet Class A criteria at ¼" (walls only) and 3/8" (walls only/standoffs only) thickness as described by the 2012 *International Building Code*.
6. Extent of Burning (UL 94). Must submit UL card.
7. Impact strength. Minimum impact strength test as measured by ASTM D 3763 of 20 ft. lbs. (for durability, shipping, installation, and use).

8. Safety Glazing. Material must attain a Class A impact rating in accordance with ANSI Z97.1-2004 at 1/8" thickness.
9. UPITT Test for Combustion Product Toxicity: Product must be recorded as "not more toxic than wood".
10. NFPA 269/ASTM 1678 test for toxicity: Product must have a best predicted LC_{50} value ≤ 80.8 g/m^3 Product must have a best predicted corrected for post-flashover conditions LC_{50} value ≤ 19.0 g/m^3
11. Dynamic environmental testing (ASTM standards D 5116 or D 6670). Panels must not have detectable VOC off-gassing agents and must be have Greenguard™ Indoor Air Quality Children and Schools certified.
12. Panels must be produced from a minimum of 40% pre-consumer recycle content. This recycle content must be certified by a recognized 3rd party certification group, such as Scientific Certification Systems (SCS).
13. Building Approvals: Plastic Fabrications are to have been evaluated and must be registered with and comply to requirements of the following jurisdictions:
    a. New York Department of Buildings (Product must have an MEA [Materials and Equipment Acceptance] number) for use as Interior Finishes
    b. Los Angeles Department of Building and Safety (Product must have a LARR [Los Angeles Research Report] number) for use as Light-transmitting Panels
    c. ICC-ES Report for Interior Finishes and Light Transmitting plastics

2.3 FABRICATION

A. General: Fabricate Plastic Fabrications to designs, sizes and thicknesses indicated and to comply with indicated standards. Sizes, profiles and other characteristics are indicated on the drawings.

B. Comply with manufacturer's written recommendations for fabrication.

C. Machining: Acceptable means of machining are listed below. Ensure that material is not chipped or warped by machining operations.

1. Sawing: Select equipment and blades suitable for type of cut required.
2. Drilling: Drills specifically designed for use with plastic products.
3. Milling: Climb cut where possible.
4. Routing
5. Tapping

D. Forming: Form products to shapes indicated using the appropriate method listed below. Comply with manufacturer's written instructions.

1. Cold Bending
2. Hot Bending
3. Thermoforming: Acceptable only on uncoated material.
4. Drape Forming
5. Matched Mold Forming
6. Mechanical Forming

E. Laminating: Laminate to substrates indicated using adhesives and techniques recommended by manufacturer.

2.4 MISCELLANEOUS MATERIALS

A. Suspension System: Wire with adjustable stainless-steel connectors. Provide three connection points to fabrication and wires the extend to a 4" disc with three connection points to minimize rotation of fabrication. Fasten disc to surface of metal acoustical deck. Provide circular shim as required for wire connection at disk.

B. General: Provide products of material, size, and shape required for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

C. Cleaner: Type recommended by manufacturer.

D. Fasteners: Use screws designed specifically for plastics. Self-threading screws are acceptable for permanent installations. Provide threaded metal inserts for applications requiring frequent disassembly such as light fixtures.

E. Bonding Cements: May be achieved with solvents or adhesives, suitable for use with product and application.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where installation of Plastic Fabrications will occur, with Installer present, for compliance with manufacturer's requirements. Verify that substrates and conditions are satisfactory for installation and comply with requirements specified.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for the installation of Plastic Fabrications.

B. Manufacturer's shop to fabricate items to the greatest degree possible.

C. Utilize fasteners, adhesives and bonding agents recommended by manufacturer for type of installation indicated. Material that is chipped, warped, hazed or discolored as a result of installation or fabrication methods will be rejected.

D. Install components plumb, level and rigid, scribed to adjacent finishes, in accordance with approved shop drawings and product data.

E. Form field joints using manufacturer's recommended procedures. Locate seams in panels so that they are not directly in line with seams in substrates.

3.3 CLEANING AND PROTECTION

A. Protect surfaces from damage until date of substantial completion. Repair work or replace damaged work, which cannot be repaired to Architect's satisfaction.

END OF SECTION 060660

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Rooftop equipment bases and support curbs.
3. Wood blocking, cants, and nailers.
4. Wood furring and grounds.
5. Wood sleepers.
6. Utility shelving.
7. Plywood backing panels.

B. Related Requirements:

1. Section 061600 "Sheathing" for sheathing, subflooring, and underlayment.

1.3 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.

4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Post-installed anchors.
6. Metal framing anchors.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Treatment shall not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841.

C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.

F. Application: Treat items indicated on Drawings, and the following:

1. Framing for raised platforms.
2. Concealed blocking.
3. Wood cants, nailers, curbs, equipment support bases, blocking, and similar members in connection with roofing.
4. Plywood backing panels.
5. Parapet sheathing

2.4 DIMENSION LUMBER FRAMING

A. Other Framing: Construction or No. 2 grade of any of the following species:

1. Hem-fir (north); NLGA.
2. Southern pine; SPIB.
3. Douglas fir-larch; WCLIB or WWPA.
4. Spruce-pine-fir; NLGA.
5. Douglas fir-south; WWPA.
6. Hem-fir; WCLIB or WWPA.
7. Douglas fir-larch (north); NLGA.
8. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

2.5 MISCELLANEOUS LUMBER

A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:

1. Blocking.
2. Nailers.
3. Rooftop equipment bases and support curbs.
4. Cants.
5. Furring.
6. Grounds.
7. Utility shelving.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species. any of the following species:

1. Hem-fir (north); NLGA.
2. Mixed southern pine or southern pine; SPIB.
3. Spruce-pine-fir; NLGA.
4. Hem-fir; WCLIB or WWPA.
5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

C. Utility Shelving: Lumber with 15 percent maximum moisture content of any of the following species and grades:

1. Eastern white pine, Idaho white, lodgepole, ponderosa, or sugar pine; Premium or No. 2 Common (Sterling) grade; NeLMA, NLGA, WCLIB, or WWPA.
2. Mixed southern pine or southern pine No. 2 grade; SPIB.
3. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
4. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

D. Concealed Boards: 15 percent maximum moisture content of any of the following species and grades:

1. Mixed southern pine or southern pine, No. 2 grade; SPIB.
2. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.

E. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

F. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

G. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

H. Provide membrane separation between treated lumber and certain metals that may be subject to corrosion from the treated woods.

2.6 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

1. Plywood shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2. Paint all mounting panels with fire retardant paint.

2.7 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.

D. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

E. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 ICC-ES AC58 ICC-ES AC193 or ICC-ES AC308 as appropriate for the substrate.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 .

2.8 METAL FRAMING ANCHORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

1. Cleveland Steel Specialty Co.
2. KC Metals Products, Inc.
3. Phoenix Metal Products, Inc.
4. Simpson Strong-Tie Co., Inc.
5. USP Structural Connectors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.

1. Use for interior locations unless otherwise indicated.

2.9 MISCELLANEOUS MATERIALS

A. Adhesives for Gluing Furring to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.

B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch .

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.

B. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.

C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.

D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Do not splice structural members between supports unless otherwise indicated.

F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.

G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:

1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal thickness.
3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.

H. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

I. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

1. Use inorganic boron for items that are continuously protected from liquid water.
2. Use copper naphthenate for items not continuously protected from liquid water.

J. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

K. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
3. ICC-ES evaluation report for fastener.

L. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 PROTECTION

A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061053

SECTION 061600 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Parapet sheathing.
3. Subflooring.
4. Underlayment.
5. Sheathing joint and penetration treatment.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for plywood backing panels.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated plywood.
2. Fire-retardant-treated plywood.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance Ratings: As tested according to ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WOOD PANEL PRODUCTS

A. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.

B. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE-TREATED PLYWOOD

A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

C. Application: Plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.4 FIRE-RETARDANT-TREATED PLYWOOD

A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Use treatment that does not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201/D 3201M at 92 percent relative humidity. Use where exterior type is not indicated.
4. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified.

C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.

D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.

E. Application: Treat plywood indicated on Drawings, and the following:

1. Roof and wall sheathing within 48 inches of fire walls.
2. Subflooring and underlayment for raised platforms.

2.5 WALL SHEATHING

A. Plywood Sheathing: Exterior, Structural sheathing.

1. Span Rating: Not less than 16/0 .
2. Nominal Thickness: As indicated on Drawings.

B. Oriented-Strand-Board Sheathing: DOC PS 2, Exposure 1.

C. Glass-Mat Gypsum Sheathing: ASTM C 1177/1177M.

1. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

a. CertainTeed Corporation; GlasRoc.
b. Georgia-Pacific Building Products; Dens-Glass Gold.

c. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.
d. Temple-Inland Building Products by Georgia-Pacific; GreenGlass Exterior Sheathing.
e. United States Gypsum Co.; Securock.

2. Type and Thickness: Type X, 5/8 inch thick.
3. Size: 48 by 96 inches, 48 by 108 inches or 48 by 120 inches for vertical installation.

2.6 PARAPET SHEATHING

A. Plywood Sheathing: Either DOC PS 1 or DOC PS 2, Exterior sheathing.

1. Span Rating: Not less than 16/0.
2. Nominal Thickness: As indicated on Drawings .

B. Glass-Mat Gypsum Sheathing: ASTM C 1177/1177M.

1. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

a. CertainTeed Corporation; GlasRoc.
b. Georgia-Pacific Building Products; Dens-Glass Gold.
c. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.
d. Temple-Inland Building Products by Georgia-Pacific; GreenGlass Exterior Sheathing.
e. United States Gypsum Co.; Securock.

2. Type and Thickness: Type X, 5/8 inch thick.
3. Size: 48 by 96 inches for vertical installation.

2.7 SUBFLOORING AND UNDERLAYMENT

A. Plywood Combination Subfloor-Underlayment: DOC PS 1, Exposure 1, Structural I, Underlayment single-floor panels.

1. Span Rating: Not less than 16.
2. Nominal Thickness: Not less than 23/32 inch .
3. Edge Detail: Square.
4. Surface Finish: Fully sanded face.

2.8 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.

1. For roof parapet and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

E. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.

1. For steel framing less than 0.0329 inch thick, use screws that comply with ASTM C 1002.
2. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C 954.

2.9 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch , of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

B. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.

B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.

C. Securely attach to substrate by fastening as indicated, complying with the following:

1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
2. ICC-ES evaluation report for fastener.

D. Use common wire nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections. Install fasteners without splitting wood.

E. Coordinate wall and sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

F. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.

G. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 WOOD STRUCTURAL PANEL INSTALLATION

A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.

B. Fastening Methods: Fasten panels as indicated below:

1. Wall and Roof Sheathing:

    a. Screw to cold-formed metal framing.
    b. Space panels 1/8 inch apart at edges and ends.

3.3 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to cold-formed metal framing with screws.
2. Install panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
3. Install panels with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.
2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.

1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.

2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.

E. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.
2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

3.4 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturers written instructions.
1. Prime substrates as recommended by flashing manufacturer.
2. Lap seams and junctures with other materials at least 4 inches, except that at flashing flanges of other construction, laps need not exceed flange width.
3. Lap flashing over weather-resistant building paper at bottom and sides of openings.
4. Lap weather-resistant building paper over flashing at heads of openings.
5. After flashing has been applied, roll surfaces with a hard rubber or metal roller to ensure that flashing is completely adhered to substrates.

END OF SECTION 061600

SECTION 064023 – INTERIOR ARCHITECTURAL WOODWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Architectural wood cabinets, bookcases, benches, display cases and trim.
2. Solid wood casework.
3. Wood veneers over MDF.
4. Wood furring, blocking, shims, and hanging strips for installing architectural woodwork/casework unless concealed within other construction before woodwork/casework installation.
5. Shop finishing of architectural woodwork.
6. Café sneeze guard glass with standoffs.
7. Lavatory Support Brackets.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products, fire-retardant-treated materials, cabinet hardware and accessories and finishing materials and processes.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.

2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
3. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural wood cabinets.
4. Show veneer leaves with dimensions, grain direction, exposed face, and identification numbers indicating the flitch and sequence within the flitch for each leaf.

C. Samples for Initial Selection:

1. Shop-applied transparent finishes.

D. Samples for Verification:

1. Lumber for transparent finish, not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.
2. Veneer leaves representative of and selected from flitches to be used for transparent-finished cabinets.
3. Lumber and panel products with shop-applied opaque finish, 5 inches wide by 12 inches long for lumber and 8 by 10 inches for panels, for each finish system and color, with one-half of exposed surface finished.
4. Corner pieces as follows:

    a. Cabinet-front frame joints between stiles and rails, as well as exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
    b. Miter joints for standing trim.

5. Exposed cabinet hardware and accessories, one unit for each type and finish.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and fabricator.

B. Product Certificates: For each type of product.

C. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

B. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.

D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that wood-veneer-faced architectural cabinets can be supported and installed as indicated.

B. Hardware Coordination: Distribute copies of approved hardware schedule specified in Section 087111 "Door Hardware (Descriptive Specification)" to fabricator of architectural woodwork; coordinate Shop Drawings and fabrication with hardware requirements.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CABINET AND WOODWORK FABRICATORS

A. Basis-of-Design Fabricator: Subject to compliance with requirements, fabricators offering interior architectural woodwork that may be incorporated into the Work will be the following. Alternate fabricators may be acceptable, pending architect's prior approval.

1. Square One Studio, 3114 Holmes, Kansas City, MO 64109; 816.753.0351; Fax: 816.531.1670; Contact: Bryan Dudley.
2. C S Humphrey & Co LLC, 7200 E. Truman Rd., Kansas City, MO 64126; 816.444.8100; Fax: 816.444.8120: Contact: Curt Humphrey.

2.2 ARCHITECTURAL WOOD CABINETS AND WOODWORK, GENERAL

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural wood cabinets indicated for construction, finishes, installation, and other requirements.

2.3 WOOD CABINETRY AND WOODWORK FOR TRANSPARENT FINISH

A. Grade: Premium.

B. Type of Construction: Frameless.

C. Cabinet and Door and Drawer Front Interface Style: Flush overlay.

D. Reveal Dimension: As indicated.

E. Wood Veneer for Exposed Surfaces with Clear Finish: WD1 as indicated and shown on finish schedule.

F. Solid Wood for Exposed Surfaces with Clear Finish: WD2 as indicated and shown on finish schedule.

G. Dust Panels: 1/4-inch plywood or tempered hardboard above compartments and drawers unless located directly under tops.

2.4 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.
2. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
2. Softwood Plywood: DOC PS 1, medium-density overlay.
3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
4. Thermoset Decorative Panels: medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.5 SNEEZE GUARDS

A. Products: At Café Servery, provide glass sneeze guards with standoffs as indicated on the drawings.

1. Glass: Clear ½" thick tempered glass with oil/smudge resistant frosted etch surface on private side (not towards public). Glass shall have square polished edges with slight chamfers. Manufacturer: Skyline Design, Eco-Etch Glass Etching. Etch as selected by Architect from manufactures standard range.
2. Standoffs: CRL Slot Mount Standoffs as manufactured by C.R. Laurence Company. Model SM12BS.

2.6 FIRE-RETARDANT-TREATED MATERIALS

A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

1. Use treated materials that comply with requirements of referenced woodworking standard. Do not use materials that are warped, discolored, or otherwise defective.
2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.

B. Fire-Retardant-Treated Lumber and Plywood: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.

1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 15 percent, respectively.
2. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.

2.7 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

C. Lavatory Support Bracket: Provide as indicated on drawings.

D. Bench Seat Support Bracket: Provide as indicated on drawings.

E. Grommets for Cable Passage through Countertops: 2.5” OD, satin chrome, metal grommets and matching metal 006C caps with slot for wire passage.

1. Product: Subject to compliance with requirements, provide PS2 by Doug Mockett & Company, Inc.

2.8 FABRICATION

A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.

B. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Corners of Cabinets: 1/16 inch unless otherwise indicated.
2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.
3. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch.

C. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

E. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

2.9 SHOP FINISHING

A. General: Finish architectural wood cabinets at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

B. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural wood cabinets, as applicable to each unit of work.

1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of cabinetry. Apply two coats to back of paneling and to end-grain surfaces.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: System - 3, postcatalyzed lacquer.
3. Wash Coat for Closed-Grain Woods: Apply wash-coat sealer to cabinets made from closed-grain wood before staining and finishing.
4. Staining: Match Architect's sample.
5. Open Finish for Open-Grain Woods: match Architects sample.
6. Sheen: Flat, 15-30 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.

B. Before installing cabinets, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with same grade as item to be installed.

B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.

C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.

D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.

E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails for exposed fastening, countersunk and filled flush with woodwork.

1. For shop finished items use filler matching finish of items being installed.

F. Casework: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.

1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
2. Maintain veneer sequence matching of cabinets with transparent finish.

3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

G. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are applied in shop.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064023

SECTION 064116 - PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Plastic-laminate-faced architectural cabinets.
2. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced architectural cabinets that are not concealed within other construction.
3. Hardware for custom built in glass display cases.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.

1.3 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: For plastic-laminate-faced architectural cabinets.

1. Include plans, elevations, sections, and attachment details.
2. Show large-scale details.
3. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
4. Show locations and sizes of cutouts and holes for items installed in plastic-laminate architectural cabinets.
5. Apply AWI Quality Certification Program label to Shop Drawings.

C. Samples: For each exposed product and for each color and texture specified, in manufacturer's or fabricator's standard size.

D. Samples for Initial Selection: For each type of exposed finish.

E. Samples for Verification: For the following:

1. Plastic Laminates: [8 by 10 inches] [12 by 12 inches], for each type, color, pattern, and surface finish required.

    a. Provide one sample applied to core material with specified edge material applied to one edge.

2. Thermoset Decorative Panels: [8 by 10 inches] [12 by 12 inches], for each color, pattern, and surface finish.

    a. Provide edge banding on one edge.

3. Corner Pieces:

    a. Cabinet-front frame joints between stiles and rails and at exposed end pieces, 18 inches high by 18 inches wide by 6 inches deep.
    b. Miter joints for standing trim.

4. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of product.

C. Quality Standard Compliance Certificates: AWI Quality Certification Program.

D. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature and relative humidity at levels planned for building occupants during the remainder of the construction period.

B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed/concealed by construction, and indicate measurements on Shop Drawings.

D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PLASTIC-LAMINATE-FACED ARCHITECTURAL CABINETS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of cabinets indicated for construction, finishes, installation, and other requirements.

1. Provide inspections of fabrication and installation together with labels and certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.

B. Grade: Custom.

C. Type of Construction: Face frame.

D. Door and Drawer-Front Style: Flush overlay.

E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Abet Laminati Inc.; .
b. Formica Corporation; .
c. Lamin-Art, Inc.; .
d. Pionite; a Panolam Industries International, Inc. brand; .
e. Wilsonart LLC; .

F. Laminate Cladding for Exposed Surfaces:

1. Horizontal Surfaces: Grade HGS.
2. Postformed Surfaces: Grade HGP.
3. Vertical Surfaces: Grade HGS.
4. Edges: Grade HGS.

5. Pattern Direction: As indicated.

G. Materials for Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, NEMA LD 3, Grade VGS.

   a. Edges of Plastic-Laminate Shelves: PVC edge banding, 0.12 inch thick, matching laminate in color, pattern, and finish.
   b. Edges of Thermoset Decorative Panel Shelves: PVC or polyester edge banding.
   c. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, NEMA LD 3, Grade VGS.

2. Drawer Sides and Backs: Thermoset decorative panels with PVC or polyester edge banding.
3. Drawer Bottoms: Thermoset decorative panels.

H. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners.

I. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As indicated by laminate manufacturer's designations.
2. Match Architect's sample.
3. As selected by Architect from laminate manufacturer's full range in the following categories:

   a. Solid colors, matte finish.
   b. Solid colors with core same color as surface, matte finish.
   c. Wood grains, matte finish.
   d. Patterns, matte finish.

2.2 PLASTIC-LAMINATE-CLAD COUNTERTOPS

A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-clad countertops indicated for construction, finishes, installation, and other requirements.

B. Grade: Custom.

C. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.

D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:

1. As selected by Architect from manufacturer's full range in the following categories:

   a. Solid colors, matte finish.
   b. Solid colors with core same color as surface, matte finish.

c. Wood grains, matte finish with grain running parallel to length of countertop.
d. Patterns, matte finish.

E. Edge Treatment: Same as laminate cladding on horizontal surfaces.

F. Core Material: Particleboard or MDF .

G. Core Material at Sinks: Particleboard made with exterior glue MDF made with exterior glue orexterior-grade plywood.

H. Core Thickness: 3/4 inch.

1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.

I. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.

J. Paper Backing: Provide paper backing on underside of countertop substrate.

2.3 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Wood Moisture Content: 5 to 10 percent.

B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 087100 "Door Hardware." Section 087111 "Door Hardware (Descriptive Specification)."

B. Basis-of-Design Product: Subject to compliance with requirements, provide the Knape &Vogt product indicated on Drawings or comparable product by one of the following unless noted otherwise:

C. Frameless Concealed Hinges: (European Type): BHMA A156.9, B01602, 170 degrees of opening, self-closing.

D. Back-Mounted Pulls: BHMA A156.9, B02011.

1. Basis of Design: Mockett DP3A

E. Catches: Magnetic catches, BHMA A156.9, B03141.

F. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.

G. Shelf Rests: BHMA A156.9, B04013; metal, two-pin type with shelf hold-down clip.

H. Drawer Slides: BHMA A156.9.
1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer.
    a. Type: Full extension.
    b. Material: Epoxy-coated steel with polymer rollers.
2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full -extension type; zinc-plated-steel ball-bearing slides.
3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 2.
4. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1HD-100.
5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-200.
6. For computer keyboard shelves, provide Grade 1.
7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-100.

I. Slides for Sliding Glass Doors: BHMA A156.9, B07063; aluminum.

J. Door Locks: BHMA A156.11, E07121.

K. Drawer Locks: BHMA A156.11, E07041.

L. Door and Drawer Silencers: BHMA A156.16, L03011.

M. Grommets for Cable Passage: 1-1/4-inch 2-inch Insert dimension OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
1. Color: Black.

N. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
1. Dark, Oxidized, Satin Bronze, Oil Rubbed: BHMA 613 for bronze base; BHMA 640 for steel base; match Architect's sample.
2. Bright Brass, Clear Coated: BHMA 605 for brass base; BHMA 632 for steel base.
3. Bright Brass, Vacuum Coated: BHMA 723 for brass base; BHMA 729 for zinc-coated-steel base.
4. Satin Brass, Blackened, Bright Relieved, Clear Coated: BHMA 610 for brass base; BHMA 636 for steel base.
5. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
6. Bright Chromium Plated: BHMA 625 for brass or bronze base; BHMA 651 for steel base.
7. Satin Stainless Steel: BHMA 630.

O. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

2.5 MISCELLANEOUS MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

2.6 FABRICATION

A. Fabricate architectural cabinets to dimensions, profiles, and details indicated.

B. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.

C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

D. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual."

1. For glass in frames, secure glass with removable stops.
2. For exposed glass edges, polish and grind smooth.

PART 3 - EXECUTION

3.1 PREPARATION

A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

A. Grade: Install cabinets to comply with quality standard grade of item to be installed.

B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.

C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with wafer-head cabinet installation screws.

D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inchesusing concealed shims.

1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.

B. Clean, lubricate, and adjust hardware.

C. Clean cabinets on exposed and semiexposed surfaces.

END OF SECTION 064116

SECTION 071113 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Cold-applied, emulsified-asphalt dampproofing for non-basement foundation walls.

B. Related Sections include the following:
   1. Division 07 Section "Self-Adhering Sheet Waterproofing."

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include recommendations for method of application, primer, number of coats, coverage or thickness, and protection course.

B. Material Certificates: For each product, signed by manufacturers.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain primary dampproofing materials and primers through one source from a single manufacturer. Provide secondary materials recommended by manufacturer of primary materials.

1.5 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.

B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following: Before retaining list below, verify that manufacturers' products comply with local VOC regulations if any.
   1. BASF
   2. ChemMasters Corp.
   3. Degussa Building Systems; Sonneborn Brand Products.
   4. Gardner Gibson, Inc.
   5. Henry Company.
   6. Karnak Corporation.

7. Koppers Inc.
8. Malarkey Roofing Products.
9. Meadows, W. R., Inc.
10. Tamms Industries, Inc.
11. Polyguard

B. Trowel Coats: ASTM D 1227, Type II, Class 1.

C. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.

D. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

E. VOC Content: Zero.

2.2 MISCELLANEOUS MATERIALS

A. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for surface smoothness and other conditions affecting performance of work.
   1. Proceed with dampproofing application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.
   2. Test for surface moisture according to ASTM D 4263.

3.2 PREPARATION

A. Protection of Other Work: Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.

B. Clean substrates of projections and substances detrimental to work; fill voids, seal joints, and apply bond breakers if any, as recommended by prime material manufacturer.

C. Apply patching compound for filling and patching tie holes, honeycombs, reveals, and other imperfections.

3.3 APPLICATION, GENERAL

A. Comply with manufacturer's written recommendations unless more stringent requirements are indicated or required by Project conditions to ensure satisfactory performance of dampproofing.
   1. Apply additional coats if recommended by manufacturer or if required to achieve coverages indicated.
   2. Allow each coat of dampproofing to cure 24 hours before applying subsequent coats.
   3. Allow 48 hours drying time prior to backfilling.

B. Apply dampproofing to all footings and foundation walls, including precast concrete wall panels below grade (except basement walls which will receive self-adhered sheet waterproofing system).
   1. Apply from finished-grade line to top of footing, extend over top of footing, and down a minimum of 6 inches over outside face of footing.
   2. Extend 12 inches onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.

3. Install flashings and corner protection stripping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch-wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.
4. No dampproofing shall be visible above grade.

3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. On Concrete or CMU Foundations: Apply 2 brush or spray coats at not less than 1.5 gal./100 sq. ft. for first coat and 1 gal./100 sq. ft. for second coat, 1 fibered brush or spray coat at not less than 3 gal./100 sq. ft., or 1 trowel coat at not less than 4 gal./100 sq. ft.

3.5 CLEANING

A. Remove dampproofing materials from surfaces not intended to receive dampproofing.

END OF SECTION 071113

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Polyisocyanurate insulation.
   2. Glass-fiber blanket insulation.
   3. Spray polyurethane foam insulation.
   4. Below grade rigid insulation

B. Related Sections:
   1. Division 07 Section “Thermoplastic Polyolefin (TPO) Roofing” for insulation specified as part of roofing construction.

1.3 SUBMITTALS

A. Product Data: For each type and form of product indicated.

B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

C. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.4 QUALITY ASSURANCE

A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
   1. Surface-Burning Characteristics: ASTM E 84.
   2. Fire-Resistance Ratings: ASTM E 119.
   3. Combustion Characteristics: ASTM E 136.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:
   1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
   2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site before installation time.
   3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 POLYISOCYANURATE INSULATION

A. Foil-Faced Polyisocyanurate-Foam Wall and Cavity insulation: ASTM C 1289, Type I, Class 1, aluminum foil-faced, glass-fiber-reinforced, rigid, cellular, polyisocyanurate thermal insulation. Foam-plastic core and facings shall have a flame-spread index of 25 or less when tested individually.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   1. Atlas Roofing Corporation.
   2. Carlisle Coating & Waterproofing
   3. Dow Chemical Company (The).
   4. Johns Manville; Berkshire Hathaway Inc.
   5. Hunter Panels
   6. Rmax, Inc.

C. Thickness: 2 inches

2.2 GLASS-FIBER BLANKET INSULATION

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. CertainTeed Corporation.
   2. Guardian Building Products, Inc.
   3. Johns Manville.
   4. Owens Corning.
   5. Knauf Insulation

B. Unfaced, Glass-Fiber Blanket Insulation: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

   1. Fiber Type: Fibers manufactured from glass.
   2 Surface Burning Characteristics: Max. flame spread and smoke developed values of 25 and 50.
   3. 3 ½" (R-13), 6" (R-19) or other as indicated on Drawings.

C. Sound Attenuation Batts: Unfaced lightweight fiberglass insulation batts, ASTM C665 Type I, non-combustible, classified 10/10 when tested in accordance with ASTM E84, up to a 2 hour rating when tested according to ASTM E119.

1. Fiber Type: Fibers manufactured from glass.
2. Surface Burning Characteristics: Max. flame spread and smoke developed values of 10 and 10.
3. 3 ½" with min STC of 49 as test with 1 layer 5/8" gypsum board each side of 25 gauge 3-5/8" metal studs at 16" O.C. Provide 5 ½" for 6" stud applications

D. Fire Safing Insulation: At fire walls, fiberglass cloth enclosed high temperature mineral wool with intumescent material (non-asbestos).

E. Low Emitting: Insulation tested according to ASTM D5116 and shown to emit less than 0.05 ppm formaldehyde.

2.3 MINERAL WOOL INSULATION – for exterior walls installed in stud cavities for thermal performance.

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. CertainTeed Corporation.
2. Guardian Building Products, Inc.
3. Johns Manville.
4. Owens Corning.
5. Knauf Insulation

B. Unfaced, Mineral wool Batt Insulation: ASTM C 665, Non-Corrosive; with maximum flame-spread and smoke-developed indexes of 25 and 0, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics; less than 1% absorption per ASYM C 1104.

1. Fiber Type: Fibers manufactured from mineral wool fibers.
2 3 ½" (R-15), 6" (R-24) or other as indicated on Drawings.

2.4 SPRAY POLYURETHANE FOAM INSULATION (Top of Wall and other building envelope conditions)

A. Closed-Cell Fire Retardant Polyurethane Foam Insulation: with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Versi-Foam Closed Cell System, Class 1 (flame retardant)
   b. Tiger Foam E-84 Fire Rated SPF Class I Insulation by Commercial Thermal Solutions, Inc.
   c. Handi-foam E84 Class 1 Fire Retardant spray foam by Industrial Insulation Sales, Inc.
   d. Quick Cure (E-84 Class I) Spray Foam
   e. Gacowallfoam 183M by GacoWestern
   f. CertaSpray Closed Cell Foam by CertainTeed Saint-Gobain
   g. Styrofoam Brand MX 2045 Foam by Dow Chemical Co.
   h. Comfort Foam 178 series by BASF
   i. Icynene ProSeal (MD-C-200v3) Spray Foam Insulation
2. Minimum density of 1.75 lb/cu. ft., thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F.

B. Install spray foam insulation in **all** cavities at perimeter walls, and where indicated on the drawings where it is not feasible to install batt or other insulation to close off any air gaps, voids, etc. for

airtight seal including but not limited to connection between walls and roofs. Install spray foam insulation in all non-grouted masonry cells at block walls.

C. Where spray foam insulation is installed in open/exposed structure, foam shall be installed with straight, smooth faces ready for paint.

2.5 BELOW GRAD RIGID INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84, for use in below grade applications only.

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
4. Atlas Roofing Corporation
5. Dow Chemical Company (The).
6. Owens Corning.

C. Type IV, 40 psi.

2.6 THERMAL AND IGNITION BARRIER

A. General: Foam plastic insulation shall be separated from the interior of building by an approved thermal barrier of ½" gypsum wallboard or a thermal and ignition barrier in accordance with Chapter 26 of the International Building Code.

B. Basis of Design: DC 315 Fireproof paint is a water-based coating as manufactured by International Fireproof Technology, Inc. – Paint To Protect; 17528 Von Karman Avenue, Irvine, CA 92614; (949) 975-8588.

C. Apply coating over all spray polyurethane foam insulation applications, unless insulation provided does not require a thermal and ignition barrier in each type of application.
1. Thickness as required to meet NFPA 286.
2. Confirm compatibility of coating with insulation manufacturer before ordering and installing insulation.

2.7 FOAMED-IN-PLACE MASONRY FOAM INSULATION

A. Basis of Design: CFI Foam, Inc. Aminoplast Masonry Foam Insulation; PO Box 10393, Knoxville, TN 37939, (800) 656-3626.

B. All empty core cells and voids within each insulated wall shall be filled with foam insulation. Walls can be filled using either top-fill or by pressure-injection techniques. Comply with manufacturer's specific written instructions and recommendations.

C. Patch holes with mortar to resemble adjacent surfaces.

2.8 INSULATION FASTENERS

A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
      b. Gemco; Spindle Type.
   2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
   3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.

B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position indicated with self-locking washer in place.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Gemco; 90-Degree Insulation Hangers.
   2. Angle: Formed from 0.030-inch- thick, perforated, galvanized carbon-steel sheet with each leg 2 inches square.
   3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.

C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. AGM Industries, Inc.; RC150.
      b. Gemco; Dome-Cap.

D. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 inch between face of insulation and substrate to which anchor is attached.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. Gemco; Clutch Clip.

E. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
   1. Products: Subject to compliance with requirements, provide one of the following:
      a. AGM Industries, Inc.; TACTOO Adhesive.
      b. Gemco; Tuff Bond Hanger Adhesive.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.

C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Insulate all walls, ceilings, and perimeter as shown, and fill all cavities and voids in structures, joints, and various assemblies. Fill box headers; place rigid insulation at cold side of all structural elements; fill voids and cracks with fiber insulation or foam type.

E. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF BELOW-GRADE INSULATION

A. On vertical footing and foundation wall surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
   1. Extend insulation to top of footing as indicated on drawings.

3.4 INSTALLATION OF CAVITY-WALL INSULATION

A. Polyisocyanurate Board Insulation: Install pads of adhesive spaced approximately 24 inches o.c. both ways on inside face, and as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.
   1. Supplement adhesive attachment of insulation by securing boards with two-piece wall ties designed for this purpose and specified in Division 04 Section "Unit Masonry."

3.5 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.

B. Foam-Plastic Board Insulation: Seal joints between units by applying adhesive, mastic, or sealant to edges of each unit to form a tight seal as units are shoved into place. Fill voids in completed installation with adhesive, mastic, or sealant as recommended by insulation manufacturer.

C. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
   1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
   2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
   3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
   4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

D. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.
   1. Spray applied insulation, installer shall provide any additional blocking or masking as necessary to form edges to terminate insulation.

E. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
   1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.6 INSTALLATION OF INSULATION FOR CONCRETE SUBSTRATES

A. Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:
   1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive according to anchor manufacturer's written instructions. Space anchors according to insulation manufacturer's written instructions for insulation type, thickness, and application indicated.
   2. Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and insulation.
   3. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation below indicated thickness.
   4. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

3.7 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Vapor-permeable, fluid-applied air barriers.

B. Related Requirements:

1. Section 061600 "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.

1.3 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.

B. Shop Drawings: For air-barrier assemblies.

1. Show locations and extent of air-barrier materials, accessories, and assemblies specific to Project conditions.
2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
3. Include details of interfaces with other materials that form part of air barrier.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by Installer, who work on Project.

B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

D. Field quality-control reports.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store liquid materials in their original un-damaged packages in a clean, dry, protected location within temperature range required by air barrier manufacturer.

B. Remove and replace liquid materials that cannot be applied within their stated shelf life.

C. Protect stored materials from direct sunlight.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

2.3 MEDIUM-BUILD AIR BARRIERS, VAPOR PERMEABLE

A. Medium-Build, Vapor-Permeable Air Barrier: Synthetic polymer material with an installed dry film thickness, according to manufacturer's written instructions, of 17 to 30 mils over smooth, void-free substrates.

1. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

    a. 3M Industrial Adhesives and Tapes Division; 3M Liquid Air Barrier 2085VP.
    b. DuPont Building Innovations: E. I. du Pont de Nemours and Company; DuPont Tyvek Fluid Applied WB.
    c. Rubber Polymer Corporation, Inc.; Rub-R-Wall Airtight VP.
    d. Sto Corp; StoGuard AirSeal.
    e. TK Products; TK-Airmax 2104 Vapor Permeable.
    f. W.R. Meadows, Inc; Air-Shield LMP.

2. Physical and Performance Properties:

    a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
    b. Vapor Permeance: Minimum 10 perms; ASTM E 96/E 96M, Desiccant Method, Procedure A.
    c. Ultimate Elongation: Minimum 250 percent; ASTM D 412, Die C.
    d. Adhesion to Substrate: Minimum 16 lbf/sq. in. when tested according to ASTM D 4541.
    e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
    f. UV Resistance: Can be exposed to sunlight for 180 days according to manufacturer's written instructions.

2.4 ACCESSORY MATERIALS

A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.

B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.

C. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.

1. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

a. Dow Corning Corporation; 123 Silicone Seal.
b. GE Construction Sealants; Momentive Performance Materials Inc.; US11000 UltraSpan.
c. Pecora Corporation; Sil-Span.
d. Tremco Incorporated; Spectrem Simple Seal.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
3. Verify that substrates are visibly dry and free of moisture. Test concrete substrates for capillary moisture by plastic sheet method according to ASTM D 4263.
4. Verify that masonry joints are flush and completely filled with mortar.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

H. Bridge **isolation joints**, **expansion joints and** discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.3 ACCESSORIES INSTALLATION

A. Install accessory materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.

B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply preformed silicone extrusion so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.

1. Transition Strip: Roll firmly to enhance adhesion.

2. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.

F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

H. Seal top of through-wall flashings to air barrier with an additional 6-inch- wide, transition strip.

I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.4 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.

1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.

B. Medium-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply an increased thickness of air-barrier material in full contact around protrusions such as masonry ties.

1. Vapor-Permeable, Medium-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, applied in one or more equal coats. Apply additional material as needed to achieve void- and pinhole-free surface, but do not exceed thickness on which required vapor permeability is based.

C. Do not cover air barrier until it has been tested and inspected by testing agency.

D. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.5 FIELD QUALITY CONTROL

A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Air-barrier dry film thickness.
3. Continuous structural support of air-barrier system has been provided.
4. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
5. Site conditions for application temperature and dryness of substrates have been maintained.
6. Maximum exposure time of materials to UV deterioration has not been exceeded.
7. Surfaces have been primed, if applicable.
8. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
9. Termination mastic has been applied on cut edges.
10. Strips and transition strips have been firmly adhered to substrate.
11. Compatible materials have been used.
12. Transitions at changes in direction and structural support at gaps have been provided.
13. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
14. All penetrations have been sealed.

C. Air barriers will be considered defective if they do not pass inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
2. Remove and replace deficient air-barrier components for retesting as specified above.

D. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

E. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 072726

SECTION 074213.13 - FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
1. Concealed-fastener, lap-seam metal wall panels.
2. Horizontal Plank Siding
3. Folded and perforated aluminum sheet panels for exterior screen wall

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal panel assembly during and after installation.
8. Review of procedures for repair of metal panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied finishes.

1. Include Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:

1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Source Limitations: Source all pre-finished panels, trim, flashing, and accessories from a single manufacturer to ensure color and quality match.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

1.8 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Wind Loads: Uniform pressure of 20lb/sq. ft., acting inward and outward.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/240 of the span.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

E. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

A. General: Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.

B. Tapered-Rib-Profile, Exposed-Fastener Metal Wall Panels;

1. Horizontal Panel Basis-of-Design Product: Subject to compliance with requirements, provide Firestone Delta CFP- 12 (50%), CFP-12B(25%), and CF-12T(25%) installed in a random manner as indicated on Drawings, or comparable product by one of the following available manufacturers;:

   a. ATAS International, Inc.
   b. CENTRIA Architectural Systems.
   c. Metal Sales & Service, Inc.
   d. Metal Sales Manufacturing Corporation.
   e. Petersen Aluminum Corporation

2. Major-Rib Spacing: Varies with Vertical Panel.
3. Panel Coverage: 12 inches.
4. Panel Height: 1.0 inch.
5. Color: As selected by architect from manufacturers FULL range of colors

C. Horizontal plank siding/soffit basis of design; HARRYWOOD by Mac Metal Architecture, nominal 6” width formed steel siding, 26 gauge. Ensure installation of wood grain patterns is randomized. Include all manufacturers mouldings, trim, etc. and follow manufacturers installation instructions for fasteners, support, and flashings by others.

D. Aluminum sheets for folded and perforated screen wall; Alloy shall be corrosion resistant 5005 or 6061, meeting visual requirements per QCA-1

1. Nominal Thickness: as required for mounting, structural performance, and to eliminate oil canning.
2. Exterior Finish: Class I Clear anodized post fabrication

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.

C. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

2.4 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
3. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Steel Panels and Accessories:
1. **Two-Coat** Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.

a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

3.3 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
5. Flash and seal panels with weather closures at perimeter of all openings.

E. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.
2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.

B. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.

C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

D. Prepare test and inspection reports.

3.5 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213.13

SECTION 074213.23 - ALUMINUM COMPOSITE MATERIAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes metal composite material wall panels.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, metal composite material panel Installer, metal composite material panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal composite material panels, including installers of doors, windows, and louvers.
2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Review methods and procedures related to metal composite material panel installation, including manufacturer's written instructions.
4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal composite material panels.
6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
7. Review temporary protection requirements for metal composite material panel assembly during and after installation.
8. Review procedures for repair of panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal composite material panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim and anchorage, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of metal composite material panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Composite Material Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal composite material panel accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, tests performed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal composite material panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of typical metal composite material panel assembly , including supports, attachments, and accessories.
2. Water-Spray Test: Conduct water-spray test of mockup of metal composite material panel assembly, testing for water penetration according to AAMA 501.2.
3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal composite material panels, and other manufactured items so as not to be damaged or deformed. Package metal composite material panels for protection during transportation and handling.

B. Unload, store, and erect metal composite material panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal composite material panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal composite material panels to ensure dryness, with positive slope for drainage of water. Do not store metal composite material panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal composite material panels during installation.

E. Copper Panels: Wear gloves when handling to prevent fingerprints and soiling of surface.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal composite material panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

A. Coordinate metal composite material panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal composite material panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal composite material panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal composite material panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 330:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: [1.57 lbf/sq. ft.] [6.24 lbf/sq. ft.].

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: [2.86 lbf/sq. ft.] [6.24 lbf/sq. ft.].

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

E. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

F. Fire Propagation Characteristics: Metal composite material wall panel system passes NFPA 285 testing.

2.2 METAL COMPOSITE MATERIAL WALL PANELS

A. Metal Composite Material Wall Panel Systems: Provide factory-formed and -assembled, metal composite material wall panels fabricated from two metal facings that are bonded to a solid, extruded thermoplastic core; formed into profile for installation method indicated. Include attachment assembly components, panel stiffeners, and accessories required for weathertight system.

1. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:
2. Basis-of-Design Product: Subject to compliance with requirements, provide Alpolic Metal Composite Materials or comparable product by one of the following available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

    a. Alcoa Architectural Products (USA) Reynobond
    b. ALUCOBOND; 3A Composites USA, Inc.; Alucobond.
    c. CENTRIA Architectural Systems; Formabond Wall System.
    d. Citadel Architectural Products, Inc.; Envelope 2000 RS.
    e. Firestone Metal Products, LLC; UNA-FAB Series 1500.

B. Aluminum-Faced Composite Wall Panels : Formed with 0.020-inch- thick, coil-coated aluminum sheet facings.

1. Panel Thickness: 0.157 inch.
2. Core: Standard Fire retardant.
3. Exterior Finish: Two-coat fluoropolymer; color as selected from manufacturer’s full color line

    a. Color: As selected by Architect from manufacturer's full range. NOTE, MCPL LOGO COLORS HAVE BEEN MATCHED TO SPECIFIC ALPOLIC COLORS AND MUST BE USED WHERE NOTED.

C. Attachment Assembly Components: Formed from material compatible with panel facing.

D. Attachment Assembly: Route and return system with wet sealant joint, sealant to match color of panel.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal composite material panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal composite material panels unless otherwise indicated.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal composite material panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal composite material panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal composite material panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal composite material panels and remain weathertight; and as recommended in writing by metal composite material panel manufacturer.

2.4 FABRICATION

A. General: Fabricate and finish metal composite material panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Fabricate metal composite material panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal composite material panel supports, and other conditions affecting performance of the Work.

1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal composite material wall panel manufacturer.
2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal composite material wall panel manufacturer.

a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and assemblies penetrating metal composite material panels to verify actual locations of penetrations relative to seam locations of metal composite material panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal composite material panel manufacturer's written recommendations.

3.3 METAL COMPOSITE MATERIAL PANEL INSTALLATION

A. General: Install metal composite material panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor metal composite material panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal composite material panels.
2. Flash and seal metal composite material panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal composite material panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal composite material panel work proceeds.

6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Align bottoms of metal composite material panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal composite material panel manufacturer.

D. Attachment Assembly, General: Install attachment assembly required to support metal composite material wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.

1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.

E. Rainscreen-Principle Installation: Install using manufacturer's standard assembly with vertical channel that provides support and secondary drainage assembly, draining at base of wall. Notch vertical channel to receive support pins. Install vertical channels supported by channel brackets or adjuster angles and at locations, spacings, and with fasteners recommended by manufacturer. Attach metal composite material wall panels by inserting horizontal support pins into notches in vertical channels and into flanges of panels. Leave horizontal and vertical joints with open reveal.

1. Install wall panels to allow individual panels to be installed and removed without disturbing adjacent panels.
2. Do not apply sealants to joints unless otherwise indicated.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal composite material panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal composite material panel manufacturer; or, if not indicated, provide types recommended in writing by metal composite material panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.

2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align metal composite material wall panel units within installed tolerance of 1/4 inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing agency to perform field tests and inspections.

B. Water-Spray Test: After installation, test area of assembly as directed by Architect for water penetration according to AAMA 501.2.

C. Metal composite material wall panels will be considered defective if they do not pass test and inspections.

D. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.

E. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal composite material panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal composite material panel installation, clean finished surfaces as recommended by metal composite material panel manufacturer. Maintain in a clean condition during construction.

B. After metal composite material panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal composite material panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074213.23

SECTION 074293 - SOFFIT PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes metal soffit panels.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Initial Selection: For each type of metal panel indicated with factory-applied color finishes.

1. Include similar Samples of trim and accessories involving color selection.

D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:

1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For each product, tests performed by a qualified testing agency.

C. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For metal panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.

B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

D. Retain strippable protective covering on metal panels during installation.

1.9 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including rupturing, cracking, or puncturing.
b. Deterioration of metals and other materials beyond normal weathering.

2. Warranty Period: Two years from date of Substantial Completion.

B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.
3. Deflection Limits: For wind loads, no greater than 1/180 of the span.

B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E 283 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:

1. Test-Pressure Difference: 6.24 lbf/sq. ft..

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METAL SOFFIT PANELS

A. General: Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.

B. Flush-Profile Metal Soffit Panels, **Solid** panels formed with vertical panel edges and **a flat pan** between panel edges; with flush joint between panels.

1. Basis-of-Design Product: Subject to compliance with requirements, provide PAC-Clad Flush/Reveal Soffit as indicated on Drawings or comparable product by one of the following available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

    a. ATAS International, Inc.
    b. Berridge Manufacturing Company.
    c. CENTRIA Architectural Systems.
    d. Firestone Building Products.
    e. MBCI; NCI Building Systems Company.
    f. McElroy Metal, Inc.

2. Aluminum Sheet: Coil-coated sheet, ASTM B 209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.

    a. Thickness: 0.040 inch.
    b. Surface: Smooth, flat finish.
    c. Exterior Finish: Two-coat fluoropolymer .
    d. Color: As selected by Architect from manufacturer's full range.

3. Panel Coverage: 8 inches maximum.
4. Panel Height: 1.0 inch.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C 645, cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 coating designation or ASTM A 792/A 792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or pre-molded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

E. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
2. Joint Sealant: ASTM C 920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.4 FABRICATION

A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.

C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.

D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.

    a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:

1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.

1. Examine framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.
2. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.

a. Verify that air- or water-resistive barriers been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

1. Soffit Framing: Wire tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.3 METAL PANEL INSTALLATION

A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.

1. Shim or otherwise plumb substrates receiving metal panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use galvanized-steel fasteners for surfaces exposed to the interior.
2. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
3. Copper Panels: Use copper, stainless-steel, or hardware-bronze fasteners.
4. Stainless-Steel Panels: Use stainless-steel fasteners.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Apply panels and associated items true to line for neat and weathertight enclosure.
2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

E. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 074293

SECTION 075423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Adhered thermoplastic polyolefin (TPO) roofing system.
2. Roof insulation.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.
2. Section 076200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
3. Section 077129 "Manufactured Roof Expansion Joints" for proprietary manufactured roof expansion-joint assemblies.
4. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.

6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:

1. Base flashings and membrane terminations.
2. Tapered insulation, including slopes.
3. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.

1. Submit evidence of compliance with performance requirements.

C. Product Test Reports: For components of roofing system, tests performed by manufacturer and witnessed by a qualified testing agency.

D. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

E. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.

1. Special warranty includes roofing, base flashings, roof insulation, cover boards, and other components of roofing system.
2. Warranty Period: 20 years from date of Substantial Completion.
3. Installer shall comply with manufacturer’s warranty requirements to resist uplift pressure at corners, perimeter, and field of roof.

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

C. The warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

1. Carlisle SynTec Incorporated.
2. Firestone Building Products.
3. GAF Materials Corporation.
4. Johns Manville.
5. Versico Incorporated.

B. Source Limitations: Obtain components including roof insulation fasteners for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.

1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.

C. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7:

1. Corner Uplift Pressure: 225 lbf/sq. ft..
2. Perimeter Uplift Pressure: 150 lbf/sq. ft..
3. Field-of-Roof Uplift Pressure: 90 lbf/sq. ft..

D. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

E. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 TPO ROOFING

A. General: Reinforced Thermoplastic Polyolefin Sheets: Uniform flexible elastomeric sheet formed from a thermoplastic polyolefin, internally reinforced, with an integral fleece backing, and complying with the following thickness, exposed face color and physical properties.

1. Breaking Strength 225 lbf (ikN) (ASTM D 751) grab method
2. Ultimate Elongation (ASTM D 751): 25 percent.
3. Brittleness Temperature (ASTM D 746): Minus 40 deg F (minus 40 deg C). min.
4. Resistance to Heat Aging : No reduction in breaking strength, elongation at break and tearing strength after 168 hours at 240 deg F (116 deg C). ASTM D 573
5. Tearing Strength: 55lbf (245N) minimum ASTM D751
6. Ozone Resistance: No cracks after 168 hours exposure of 50 percent elongated sample at 104 deg F (40 deg C) and 100-pphm ozone, ASTM D 1149
7. Water vapor permeance, Perms: 0.10 max
8. Thickness: 60 mils, nominal
9. Exposed Face Color: White.

B. Fully Adhered TPO Membrane: Manufacturer's standard installation. Equal to Johns Manville JM TPO FB 115 single ply roofing system.

1. Available Manufacturers/Products: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
   a. Carlisle Syntec Systems
   b. Firestone
   c. GAF
   d. Versico

2.4 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.

1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils thick, minimum, of same color as TPO sheet.

C. Bonding Adhesive: Manufacturer's standard.

D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

E. Fasteners: Factory-coated steel fasteners and metal or plastic plates designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.

F. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.5 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by TPO roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Clas1, Grade 2, felt or glass-fiber mat facer. Provide minimum R30.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

a. Atlas Roofing Corporation.
b. Firestone Building Products.
c. GAF Materials Corporation.
d. Homasote Company.
e. Hunter Panels.
f. Insulfoam LLC; a Carlisle company.
g. Johns Manville.
h. Versico Incorporated

C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of min 1/4 inch per 12 inches or as shown on Drawings. Provide minimum thickness insulation as required to achieve R-30 at all roof areas above enclosed buildings. At canopies, provide thickness indicated on the drawings to coordinate with parapets/roof edges.

1. Contractor to examine all drawings including structural for locations requiring tapered insulation. Provide tapered insulation as necessary whether specifically noted on drawings or not.

D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.6 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.

B. Fasteners: Factory-coated steel fasteners and metal or plastic plates designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:

1. Modified asphaltic, asbestos-free, cold-applied adhesive.
2. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
3. Full-spread spray-applied, low-rise, two-component urethane adhesive.

D. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch thick.

1. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

    a. CertainTeed Corporation; GlasRoc Sheathing GlasRoc Sheathing Type X.
    b. Georgia-Pacific Corporation; Dens Deck Dens Deck DuraGuard Dens Deck Prime.
    c. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.
    d. Temple-Inland, Inc; GreenGlass Exterior Sheathing.
    e. USG Corporation; Securock Glass Mat Roof Board.

2.7 WALK PADS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick, and acceptable to membrane roofing system manufacturer.

1. Size: 24 by 24 inches pads or 24” wide rolls. Manufacture pavers to dimensional tolerances of plus or minus 1/16 inch in length, height, and thickness.
2. Colors and Textures: white.

B. Provide walk pads from roof access points to each roof mounted equipment service side, and from one roof access point to another, even if not specifically indicated on the drawings. Secure to roof according to roof system manufacturer’s written instructions.

1. Verify service side of mechanical units with unit manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:

1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 053100 "Steel Decking."

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

3.3 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions.

B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.4 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

G. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:

1. Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 sq. ft., and allow primer to dry.
2. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

H. Mechanically Fastened and Adhered Insulation: Install first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Set each subsequent layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

I. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.

1. Fully adhere cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.5 ADHERED ROOFING INSTALLATION

A. Adhere roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.

B. Start installation of roofing in presence of roofing system manufacturer's technical personnel.

C. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

D. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.

E. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeter of roofing.

F. Apply roofing with side laps shingled with slope of roof deck where possible.

G. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
2. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

I. Install membrane roofing and auxiliary materials to tie into existing roofing to maintain weathertightness of transition and not void warranty for existing membrane roofing.

J. Proceed

3.6 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.

E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.7 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.8 FIELD QUALITY CONTROL

A. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

B. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

C. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.9 PROTECTING AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.10 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: <**Insert name of Owner**>.
2. Address: <**Insert address**>.
3. Building Name/Type: <**Insert information**>.
4. Address: <**Insert address**>.
5. Area of Work: <**Insert information**>.
6. Acceptance Date: _____.
7. Warranty Period: <**Insert time**>.
8. Expiration Date: _____.

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

    a. lightning;
    b. peak gust wind speed exceeding 90 mph;
    c. fire;
    d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
    f. vapor condensation on bottom of roofing; and
    g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.

4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's Construction Manager.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____.
2. Name: _____.
3. Title: _____.

END OF SECTION 075423

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manufactured through-wall flashing with counterflashing.
2. Manufactured reglets with counterflashing.
3. Formed roof-drainage sheet metal fabrications.
4. Formed low-slope roof sheet metal fabrications.
5. Formed wall sheet metal fabrications.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.3 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.

3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 1-1/2 inches per 12 inches .

C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of coping and roof edge flashing that is SPRI ES-1 tested.

C. Product Test Reports: For each product, for tests performed by a qualified testing agency.

D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1. For copings and roof edge flashings that are SPRI ES-1 tested and FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.9 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. Fabricate and install roof edge flashing and copings capable of resisting the following forces for Wind Zone2:

1. Velocity pressures of 37.5 to 45 lbf/sq. ft.

2. Perimeter uplift force: 150 lbf/sq. ft.

3. Corner uplift force: 225 lbf/sa. Ft.

D. SPRI Wind Design Standard: Manufacture and install copings roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:

1. Design Pressure: Reference http://www.metalera.com/CalcWind.aspx?!d=2098.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Aluminum Sheet: ASTM B 209 , alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

1. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Color: Match Existing Prefinished Sheet Metal or as selected by architect from manufacturer’s full range of colors.

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226**/**D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F; and complying with physical requirements of ASTM D 226/D 226M for Type I and Type II felts.

C. Self-Adhering, High-Temperature Sheet: Minimum 30 mils thick, consisting of a slip-resistant polyethylene film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F or higher.
2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F or lower.

D. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft.minimum.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.

D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polysulfide silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

F. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.

G. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

a. Cheney Flashing Company.
b. Fry Reglet Corporation.
c. Heckmann Building Products, Inc.
d. Hickman Company, W. P.
e. Hohmann & Barnard, Inc.
f. Keystone Flashing Company, Inc.
g. National Sheet Metal Systems, Inc.
h. Sandell Manufacturing Co., Inc.

2. Material: Galvanized steel, 22 gauge or aluminum .024 inch thick.
3. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
4. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
5. Accessories:

a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing's lower edge.

6. Finish: Mill With manufacturer's standard color coating.

B. Manufactured Copings: Units of type, material, and profile required, and compatible with flashing indicated with factory-mitered and -welded corners and junctions.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Hickman Company, Permasnap Coping System (.050 inch aluminum) or comparable product by one of the following:

a. Cheney Flashing Company.
b. Fry Reglet Corporation.
c. Heckmann Building Products, Inc.
d. Hohmann & Barnard, Inc.
e. Keystone Flashing Company, Inc.
f. National Sheet Metal Systems, Inc.
g. Sandell Manufacturing Co., Inc.

2. Provide 60 mil membrane flashing under coping system at all parapet walls.

2.6 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

F. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

H. Do not use graphite pencils to mark metal surfaces.

2.7 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- long sections. Furnish flat-stock gutter brackets and flat-stock gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.

1. Gutter Profile: Per drawings or square if not shown.
2. Expansion Joints: Lap type.
3. Gutters with Girth 21 to 25 Inches : Fabricate from the following materials:

    a. Aluminum: 0.050 inch thick.
    b. Pre-finished Steel: 16 gauge.

B. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows and offsets. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.

1. Fabricated Hanger Style: Custom
2. Fabricate from the following materials:

    a. Aluminum: 0.032 inch thick.
    b. Pre-finished Steel: 22 gauges.

C. Splash Pans: Fabricate to dimensions and shape required and from the following materials:
1. Aluminum: 0.040 inch thick.

2.8 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing (Gravel Stop) and Fascia Cap: Fabricate in minimum 96-inch- long, but not exceeding 12-foot- long sections. Furnish with 6-inch- wide, joint cover plates. Shop fabricate interior and exterior corners.

1. Joint Style: Overlapped, 4 inches wide.

2. Fabricate with scuppers spaced 10 feet apart, to dimensions required with 4-inch- wide flanges and base extending 4 inches beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper.
3. Fabricate from the Following Materials:

    a. Aluminum: 0.050 inch thick.
    b. Pre-finished/galvanized Steel: 16 gauge.

B. Roof and Roof-to-Wall Transition Roof-to-Roof Edge-Flashing (Gravel-Stop) Transition Roof-to-Roof Edge-Flashing (Gravel-Stop) and Fascia-Cap Transition Expansion-Joint Cover: Fabricate from the following materials: Shop fabricate interior and exterior corners.

1. Aluminum: 0.050 inch thick.
2. Pre-finished/galvanized Steel: 16 gauge.

C. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:

1. Aluminum: 0.040 inch thick.
2. Pre-finished/galvanized Steel: 18 gauge.

D. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.
2. Pre-finished/galvanized Steel: 20 gauge.

E. Flashing Receivers: Fabricate from the following materials:

1. Aluminum: 0.032 inch thick.
2. Pre-finished/galvanized Steel: 20 gauge.

F. Roof-Penetration Flashing: Fabricate from the following materials:

1. Copper: 16 oz./sq. ft. .
2. Pre-finished/galvanized Steel: 20 gauge.

2.9 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high, end dams. Fabricate from the following materials:

1. Zinc-Tin Alloy-Coated Copper: 16 oz./sq. ft. .

B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:

1. Copper: 16 oz./sq. ft. .
2. Aluminum: 0.032 inch thick.
3. Galvanized Steel: 0.022 inch thick.

4. Aluminum-Zinc Alloy-Coated Steel: 0.022 inch thick.

C. Wall Expansion-Joint Cover: Fabricate from the following materials:

1. Copper: 16 oz./sq. ft. .
2. Aluminum: 0.040 inch thick.
3. Galvanized Steel: 0.028 inch thick.
4. Aluminum-Zinc Alloy-Coated Steel: 0.028 inch thick.

2.10 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Break Metal Covers, Closures or Trims

1. Aluminum: 0.040 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches . Roll laps and edges with roller. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
3. Space cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
5. Torch cutting of sheet metal flashing and trim is not permitted.
6. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Coat concealed side of uncoated-aluminum sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Rivets: Rivet joints in uncoated aluminum where necessary for strength.

3.4 ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters: Join sections with joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.

1. Fasten gutter spacers to front and back of gutter.
2. Anchor and loosely lock back edge of gutter to continuous eave or apron flashing.
3. Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.
4. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet apart. Install expansion-joint caps.

C. Downspouts: Join sections with 1-1/2-inch telescoping joints.

1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c.
2. Provide elbows at base of downspout to direct water away from building.
3. Connect downspouts to underground drainage system.

D. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in elastomeric sealant compatible with the substrate.

E. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches in direction of water flow.

3.5 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.

1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch centers.
2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch centers.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints minimum of 4 inches . Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.6 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 042000 "Unit Masonry."

C. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.7 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.8 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 077200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof hatches.

B. Related Sections:

1. Section 055000 "Metal Fabrications" for metal vertical ladders, ships' ladders, and stairs for access to roof hatches.
2. Section 076200 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.
3. Section 237413 "Packaged, Outdoor, Central-Station Air-Handling Units" for standard curbs specified with rooftop units.

1.3 COORDINATION

A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of roof accessory.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.6 WARRANTY

A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

2.2 ROOF HATCH

1. Roof Hatches: Metal roof-hatch units with lids and insulated single -walled curbs, welded and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, straight sides, and integrally formed deck-mounting flange at perimeter bottom. Basis of design; Bilco Type E Roof Hatch. Other acceptable manufacturers;

a. Custom Solution Roof and Metal Products.
b. Dur-Red Products
c. Babcock-Davis Hatchways

B. Type and Size: Single-leaf lid, size 36”x 36”, cover and curb shall be aluminum (mill finish) 11 ga. with 3" beaded flange, neatly welded. Insulation shall be glass fiberboard 1" thickness, fully covered and protected by an aluminum liner. Include EPDM rubber gasket, heavy duty hinges, and lift assist compression spring operators. Provide manufacturer’s standard hardware with padlock hasps inside and outside, type 316 stainless.

C. Accessories:

1. Retractable safety post: Bilco Model #LU-1.
2. Fall Protection Rail: Bil-Guard Hatch Rail System: Model #RL-E.

D. Curb Type: Curb shall be 12" in height and of aluminum 11 gauge. It shall be formed with a 3-1/2" flange with holes provided for securing to the roof deck. Curb shall be equipped with and integral metal cap flashing of the same gauge and material as the curb, full welded at the corners for weathertightness. Cap flashing shall be equipped with the Bilclip flashing system, including stamped tabs and Pak-Rope. Insulation on the exterior of the curb shall be rigid fiber board 1" in thickness, Scuttle shall be completely assembled with heavy pintle hinges, compression spring operators enclosed in telescopic tubes, positive snap latch with turn handles and padlock hasps inside and outside, and thermoplastic rubber gasket. Cover shall be equipped with an automatic hold-open arm complete with red vinyl grip handle to permit easy release. All hardware shall be zinc plated and chromate sealed, and factory finish shall be aluminum mill finish.

E. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.

F. Hatch Material: Aluminum sheet.

1. Thickness: Manufacturer's standard thickness for hatch size indicated .
2. Finish: Mill .

G. Construction:

1. Insulation: Glass-fiber board.

    a. R-Value: 12.0 according to ASTM C 1363.

1. Nailer: Factory-installed wood nailer continuous around hatch perimeter.
2. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
3. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
4. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
5. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.

H. Hardware: Spring operators, hold-open arm, stainless-steel spring latch with turn handles, stainless-steel butt- or pintle-type hinge system, and padlock hasps inside and outside.

1. Provide two-point latch on lids larger than 84 inches.

I. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.

1. Operation: Post locks in place on full extension; release mechanism returns post to closed position.
2. Height: 42 inches above finished roof deck.
3. Material: Steel tube.
4. Post: 1-5/8-inch- diameter pipe.
5. Finish: Manufacturer's standard baked enamel or powder coat.

    a. Color: As selected by Architect from manufacturer's full range.

2.3 METAL MATERIALS

A. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, AZ50 coated.

1. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A 755/A 755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent PVDF resin by weight.

B. Aluminum Sheet: ASTM B 209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Mill Finish: As manufactured.

C. Aluminum Extrusions and Tubes: ASTM B 221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.

B. Cellulosic-Fiber Board Insulation: ASTM C 208, Type II, Grade 1, thickness as indicated.

C. Glass-Fiber Board Insulation: ASTM C 726, nominal density of 3 lb/cu. ft., thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F, thickness as indicated.

D. Polyisocyanurate Board Insulation: ASTM C 1289, thickness and thermal resistivity as indicated.

E. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick.

F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

G. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.

B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

C. Verify dimensions of roof openings for roof accessories.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Roof-Hatch Installation:

1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
2. Attach safety railing system to roof-hatch curb.
3. Attach ladder-assist post according to manufacturer's written instructions.

C. Seal joints with elastomeric as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780**/**A 780M.

B. Clean exposed surfaces according to manufacturer's written instructions.

C. Clean off excess sealants.

D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077200

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane joint sealants.
3. Latex joint sealants.

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product.

B. Provide physical samples for any product requiring color selection

C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.
4. Joint-sealant color.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

B. Product Testing: Provide reports based on evaluation of comprehensive tests performed by a qualified testing agency, indicating the sealants comply with requirements.

1.5 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet.

3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. GE Construction Sealants; SCS2700 SilPruf LM .
b. Sika Corporation U.S.; Sikasil WS-290 Sikasil WS-290 FPS.

B. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation; 791.
b. GE Construction Sealants; Momentive Performance Materials Inc; SCS2000 SilPruf.
c. May National Associates, Inc., a subsidiary of Sika Corporation U.S.; Bondaflex Sil 265 LTS.
d. Pecora Corporation; PCS.
e. Sika Corporation U.S.; Sikasil WS-295 Sikasil WS-295 FPS.

C. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Dow Corning Corporation; 758.
b. GE Construction Sealants; Momentive Performance Materials Inc; SCS2350.
c. Polymeric Systems, Inc.; PSI-631 PSI-641.
d. Schnee-Morehead, Inc., an ITW company; SM5731 Poly-Glaze Plus.

e. Sherwin-Williams Company (The); White Lighning Silicone Ultra All Purpose Sealant.

D. Silicone, M, P, 100/50, T, NT: Multicomponent, pourable, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type M, Grade P, Class 100/50, Uses T and NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. May National Associates, Inc., a subsidiary of Sika Corporation U.S.; Bondaflex Sil 728 RCS.

2.3 URETHANE JOINT SEALANTS

A. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Construction Chemicals - Building Systems; Sonolastic SL 1.
b. Pecora Corporation; NR-201.
c. Polymeric Systems, Inc.; Flexiprene 952.
d. Schnee-Morehead, Inc.; an ITW company; Permathane SM7101.
e. Sherwin-Williams Company (The); Stampede 1SL.

2.4 LATEX JOINT SEALANTS

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Construction Chemicals - Building Systems; Sonolac.
b. May National Associates, Inc., a subsidiary of Sika Corporation U.S.; Bondaflex 600 Bondaflex Sil-A 700.
c. Pecora Corporation; AC-20.
d. Sherwin-Williams Company (The); 850A 950A PowerHouse.
e. Tremco Incorporated; Tremflex 834.

2.5 ACOUSTICAL JOINT SEALANTS

A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
   a. Pecora Corporation; AC-20 FTR or AIS-919.
   b. USG Corporation; SHEETROCK Acoustical Sealant.

2.6 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the followin

a. BASF Construction Chemicals - Building Systems.
b. Construction Foam Products, a division of Nomaco, Inc.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.7 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

    a. Concrete.
    b. Masonry.
    c. Exterior insulation and finish systems.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

    a. Metal.
    b. Glass.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.

3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces. JS#1

1. Joint Locations:

a. Control and expansion joints in unit masonry.
b. Joints between metal panels.
c. Joints between different materials listed above.
d. Perimeter joints between materials listed above and frames of louvers.

2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.

B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces. JS#2

1. Joint Locations:

    a. Control and expansion joints on exposed interior surfaces of exterior walls.
    b. Tile control and expansion joints.
    c. Vertical joints on exposed surfaces of unit masonry concrete wallsand partitions.

2. Joint Sealant: Urethane, S, NS, 25, NT.

C. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces. JS#3.

1. Joint Locations:

    a. Joints between plumbing fixtures and adjoining walls, floors, and counters.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Interior standard steel doors and frames.
2. Exterior standard steel doors and frames.

B. Related Requirements:

1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.
2. Division 09 Section "Painting" for field painting hollow metal.
3. Division 26 Sections for electrical connections including conduit and wiring for door controls and operators.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, temperature-rise ratings, and finishes.

B. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.

C. Samples for Initial Selection: For hollow-metal doors and frames with factory-applied color finishes.

D. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.6 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain hollow metal work from single source from single manufacturer.

B. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated or required, provide fire-rated door and frame assemblies that comply with NFPA 80 "Standard for Fire Doors and Windows", and have been tested, listed, and labeled in accordance with ASTM E 152 "Standard Methods of Fire Tests of Door Assemblies" by a nationally recognized independent testing and inspection agency acceptable to authorities having jurisdiction.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation. Do not store in a manner that traps excess humidity.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

1. Amweld Building Products, LLC.
2. Benchmark; a division of Therma-Tru Corporation.
3. Ceco Door Products; an Assa Abloy Group company.
4. Curries Company; an Assa Abloy Group company.
5. Kewanee Corporation (The).
6. Mesker Door Inc.
7. Steelcraft; an Ingersoll-Rand company.
8. Windsor Republic Doors
9. Allied Steel Products, Inc.
10. Republic Builders Products Corp./Subs. Republic Steel

2.3 PERFORMANCE REQUIREMENTS

A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Smoke- and Draft-Control Assemblies: Provide assemblies with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.

B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

C. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.50 deg Btu/F x h x sq. ft. when tested according to ASTM C 518.

2.4 INTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Heavy-Duty Doors and Frames: SDI A250.8, Level 2; SDI A250.4, Level B.

1. Doors:

a. Type: As indicated in the Door and Frame Schedule.

b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch (18 guage).
d. Edge Construction: Model 1, Full Flush.
e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
f. Core: Manufacturer's standard.
g. Fire-Rated Core: Manufacturer's standard core for fire-rated and temperature-rise-rated doors.

2. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch.
b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
c. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.5 EXTERIOR STANDARD STEEL DOORS AND FRAMES

A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Extra-Heavy-Duty Doors and Frames: SDI A250.8, Level 3; SDI A250.4, Level A.

1. Doors:

a. Type: As indicated in the Door and Frame Schedule.
b. Thickness: 1-3/4 inches.
c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum coating.
d. Edge Construction: Model 2, Seamless.
e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
h. Core: Manufacturer's standard .
i. Fire-Rated Core: Manufacturer's standard core for fire-rated doors.

2. Frames:

a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 coating.
b. Construction: Full profile welded.

3. Exposed Finish: Prime.

2.6 BORROWED LITES

A. Fabricate of metallic-coated steel sheet, minimum thickness of 0.053 inch.

B. Construction: Full profile welded.

C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.

D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.7 FRAME ANCHORS

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
3. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch thick, with corrugated or perforated straps not less than 2 inches wide by 10 inches long; or wire anchors not less than 0.177 inch thick.
4. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch thick.
5. Compression Type for Drywall Slip-on Frames: NOT PERMITTED.
6. Postinstalled Expansion Anchor: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location

B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.

C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.

D. Material: ASTM A 879/A 879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.

1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M; hot-dip galvanized according to ASTM A 153/A 153M, Class B.

2.8 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.

E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.

G. Glazing: Comply with requirements in Section 088000 "Glazing."

2.9 FABRICATION

A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.

1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding, or by rigid mechanical anchors.
2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.

    a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
    b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.

C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.

D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.

1. Provide stops and moldings flush with face of door, and with beveled stops unless otherwise indicated.
2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.

4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.10 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

A. General: Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.

B. Hollow-Metal Frames: Comply with SDI A250.11.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.

a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
b. Install frames with removable stops located on secure side of opening.

2. Fire-Rated Openings: Install frames according to NFPA 80.
3. Floor Anchors: Secure with postinstalled expansion anchors.

a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

4. Solidly pack mineral-fiber insulation inside frames.

5. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors.
7. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:

    a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.

1. Non-Fire-Rated Steel Doors: Comply with SDI A250.8.
2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
3. Smoke-Control Doors: Install doors according to NFPA 105.

D. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 CLEANING AND TOUCHUP

A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

B. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish according to manufacturer's written instructions.

END OF SECTION 081113

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.

B. Related Requirements:

1. Section 088000 "Glazing" for glass view panels in flush wood doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of door. Include details of core and edge construction, louvers, and trim for openings. Include factory-finishing specifications.

B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:

1. Dimensions and locations of blocking.
2. Dimensions and locations of mortises and holes for hardware.
3. Dimensions and locations of cutouts.
4. Undercuts.
5. Requirements for veneer matching.
6. Doors to be factory finished and finish requirements.
7. Fire-protection ratings for fire-rated doors.

C. Samples for Initial Selection: For factory-finished doors.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is a certified participant in AWI's Quality Certification Program.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

B. Package doors individually in plastic bags or cardboard cartons.

C. Mark each door on bottom rail with opening number used on Shop Drawings.

1.6 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 43 and 70 percent during remainder of construction period.

1.7 WARRANTY

A. A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
b. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

1. Algoma Hardwoods, Inc.
2. Ampco.
3. Chappell Door Co.
4. Eggers Industries.
5. General Veneer Manufacturing Co.
6. Graham Wood Doors; an Assa Abloy Group company.
7. Haley Brothers, Inc.
8. Ipik Door Company.
9. Lambton Doors.
10. Marlite.
11. Marshfield Door Systems, Inc.

12. Mohawk Doors; a Masonite company.
13. Oshkosh Door Company.
14. Poncraft Door Company.
15. Vancouver Door Company.
16. VT Industries, Inc.

B. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with AWI's, AWMAC's, and WI's "Architectural Woodwork Standards WDMA I.S.1-A, "Architectural Wood Flush Doors."

1. Contract Documents contain selections chosen from options in quality standard and additional requirements beyond those of quality standard. Comply with those selections and requirements in addition to quality standard.

B. WDMA I.S.1-A Performance Grade:

1. Extra Heavy Duty unless otherwise indicated.

C. Acoustically rated doors: Provide wood doors tested with an assembly matching specified and detailed conditions to meet minimum STC rated noted on schedule tested in accordance with ASTM E90 and E413. Include all required seals and hardware per specification “Section 087100 – Door Hardware.”

D. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
2. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
3. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
4. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
5. Pairs: Provide formed-steel edges and astragals with intumescent seals.

    a. Finish steel edges and astragals to match door hardware lockset or exit device.

E. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control, based on testing according to UL 1784.

F. Mineral-Core Doors:

1. Core: Noncombustible mineral product complying with requirements of referenced quality standard and testing and inspecting agency for fire-protection rating indicated.

2. Blocking: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated as needed to eliminate through-bolting hardware.
3. Edge Construction: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

A. Interior Solid-Core Doors :

1. Grade: Premium, with Grade AA faces .
2. Species: **Hickory (to match wood baffles).**
3. Cut: Plain sliced (flat cut) .
4. Match between Veneer Leaves: Book match.
5. Assembly of Veneer Leaves on Door Faces: Balance match.
6. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
7. Transom Match: Continuous match.
8. Exposed Vertical Edges: Same species as faces or a compatible species - edge Type A.
9. Core: Particleboard .
10. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
11. WDMA I.S.1-A Performance Grade: Extra Heavy Duty.

2.4 LIGHT FRAMES AND LOUVERS

A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.

1. Wood Species: Species compatible with door faces .
2. Profile: Manufacturer's standard flush shape.

B. Metal Louvers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. Air Louvers, Inc.
    b. Anemostat; a Mestek company.
    c. L & L Louvers, Inc.
    d. Louvers & Dampers, Inc.; a division of Mestek, Inc.
    e. McGill Architectural Products.

2. Blade Type: Vision-proof, inverted V.
3. Metal and Finish: Hot-dip galvanized steel, 0.040 inch thick, factory primed for paint with baked-enamel- or powder-coated finish.

2.5 FABRICATION

A. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.

1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.
2. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.

B. Openings: Factory cut and trim openings through doors.

1. Light Openings: Trim openings with moldings to match veneer with flush profile.
2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
3. Louvers: Factory install louvers in prepared openings.

2.6 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.

1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.

B. Factory finish doors.

C. Transparent Finish:

1. Grade: Premium.
2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 11, catalyzed polyurethane.
3. Staining: As selected by Architect from manufacturer's full rang
4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
5. Sheen: Semigloss.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and installed door frames, with Installer present, before hanging doors.

1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
2. Reject doors with defects.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Hardware: For installation, see Section 087100 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.

1. Install fire-rated doors according to NFPA 80.
2. Install smoke- and draft-control doors according to NFPA 105.

C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.

1. Clearances: Provide 1/8 inch at heads, jambs, and between pairs of doors. Provide 1/8 inch from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide1/4 inch from bottom of door to top of threshold unless otherwise indicated.

a. Comply with NFPA 80 for fire-rated doors.

2. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.

3. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

A. Operation: Rehang or replace doors that do not swing or operate freely.

B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes access doors and frames for walls and ceilings.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each type of access door and frame and for each finish specified.

C. Product Schedule: Where required for access to building systems and as indicated in drawings.

1.3 CLOSEOUT SUBMITTALS

A. Record Documents: For fire-rated doors, list of applicable room name and number in which access door is located.

1.4 QUALITY ASSURANCE

A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, section 5.2.3.1 and the following:

1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

PART 2 - PRODUCTS

2.1 ACCESS DOORS AND FRAMES

A. Interior Flush GFRG Access Doors with Concealed Flanges:

1. Manufacturer: Karp Inc., 260 Spagnoli Road Melville NY 11747 USA, info@karpinc.com, 631-768-8300 www.karpinc.com.
2. Description: Face of drop-in or concealed-hinge door flush with frame, with concealed flange for gypsum board installation.
3. Locations: Wall and ceiling.
4. Door Size: As required or indicated.
5. Door Type Drop in, radius corner or Concealed-hinge, radius corner.
6. Door and Frame Material: Unpainted glass-fiber-reinforced gypsum, with frames reinforced for hardware and fastenings.
7. Latch and Lock: Cam latch, key operated in public accessible locations.

2.2 MATERIALS

A. Glass Fiber Reinforced Gypsum.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879/A879M, with cold-rolled steel sheet substrate complying with ASTM A1008/A1008M, Commercial Steel (CS), exposed.

D. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.

E. Frame Anchors: Same material as door face.

F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.3 FABRICATION

A. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.

B. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.

C. Latch and Lock Hardware:

1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
2. Keys: Furnish two keys per lock and key all locks alike.
3. Mortise Cylinder Preparation: Where indicated, prepare door panel to accept cylinder specified in Section 087100 "Door Hardware."

2.4 FINISHES

A. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

2. Final Finish: Finished: Match adjacent wall or ceiling finish.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with manufacturer's written instructions for installing access doors and frames.

B. Adjust doors and hardware, after installation, for proper operation.

3.2 FIELD QUALITY CONTROL

A. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.

B. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

END OF SECTION 083113

SECTION 083326 - OVERHEAD COILING GRILLE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Electric operated open-curtain overhead coiling grille.
2. Cylinder key activation of controls. Coordinate with owners keying system

1.3 ACTION SUBMITTALS

A. Product Data: For each type and size of overhead coiling grille and accessory.

1. Include construction details, material descriptions, dimensions of individual components, profiles for curtain components, and finishes.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

1. Include plans, elevations, sections, and mounting details.
2. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
4. Show locations of controls, locking devices, and other accessories.
5. Include diagrams for power, signal, and control wiring.

C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

1. Include similar Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:

1. Open-curtain grille with full-size components consisting of rods, spacers, and links as required to illustrate each assembly.
2. Bottom bar with sensor edge.

3. Guides.
4. Mounting frame.
5. Brackets.
6. Concealed Hood.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For overhead coiling grilles to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

B. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design", the ABA standards of the Federal agency having jurisdiction and ICC A117.1.

1.7 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of grilles that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain overhead coiling grilles from single source from single manufacturer.

1. Obtain operators and controls from overhead coiling-grille manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Overhead coiling grilles shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Component Importance Factor: 1.0.

2.3 OPEN-CURTAIN GRILLE ASSEMBLY

A. Open-Curtain Grille: Overhead coiling grille with a curtain having a network of horizontal rods that interconnect with vertical links.

1. Basis of Design Manufacturer: Cornell - 24 Elmwood Ave. Mountain Top, PA 18707. Telephone: (800) 233-8366. Underwriters Laboratories, Inc. (UL), ISO 9001:2008 Registered.

a. Model: Visionaire ESG12 with a “Brick” design patten.

2. Approved Equal: Cookson - 1901 South Litchfield Rd, Goodyear, AZ, 85338. Telephone: (800) 294-4358.

B. Operation Cycles: Grille components and operators capable of operating for not less than **20,000**. One operation cycle is complete when a grille is opened from the closed position to the fully open position and returned to the closed position.

C. Grille Curtain Material: Aluminum.

1. Rod Spacing: Approximately 2 inches (51 mm) o.c.
2. Link Spacing: Approximately 9 inches (228 mm) apart in a brick (staggered) pattern.
3. Spacers: Metal tubes matching curtain material.

D. Bottom Bar: Continuous tubular shape, fabricated from aluminum extrusion and finished to match grille.

E. Curtain Jamb Guides: Concealed aluminum with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise. Steel tube, floor saddles and hardware as recommended by manufacturer to support grille.

F. Hood: Galvanized steel where concealed.

1. Shape: Round or Square.
2. Mounting: Between jambs on mounting frame by manufacturer.

G. Electric Grille Operator:

1. Usage Classification: Light duty, up to 10 cycles per hour.
2. Operator Location: Wall.
3. Safety: Listed according to UL 325 by a qualified testing agency for commercial use**;** moving parts of operator enclosed or guarded if exposed and mounted at 8 feet (2.4 m) or lower.
4. Motor Exposure: Interior.
5. Motor Electrical Characteristics:

a. Horsepower: As recommended by manufacturer for size and use.
b. Voltage: 120-V ac, 20 amp, single phase, 60 Hz.

6. Emergency Manual Operation: Push-up type.
7. Obstruction-Detection Device: Automatic electric sensor edge on bottom bar.

a. Sensor Edge Bulb Color: As selected by Architect from manufacturer's full range.

8. Control Station: Interior mounted.

H. Grille Finish:

1. Aluminum Finish: Clear anodized.

2.4 MATERIALS, GENERAL

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.5 GRILLE CURTAIN MATERIALS AND CONSTRUCTION

A. Open-Curtain Grilles: Fabricate metal grille curtain as an open network of horizontal rods, spaced at regular intervals, that are interconnected with vertical links, which are formed and spaced as indicated and are free to rotate on the rods.

1. Aluminum Grille Curtain: ASTM B221 (ASTM B221M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.

B. Bottom Bar: Manufacturer's standard continuous shape unless otherwise indicated, finished to match grille.

1. Astragal: Equip grille bottom bar with a replaceable, adjustable, continuous, compressible gasket of flexible vinyl, rubber, or neoprene as a cushion bumper.
2. Provide motor-operated grilles with combination bottom astragal and sensor edge.

C. Grille Curtain Jamb Guides: Manufacturer's standard shape having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent overtravel of curtain.

1. Removable Posts and Jamb Guides: Manufacturer's standard.

2.6 HOODS AND ACCESSORIES

A. General: Form sheet metal hood to entirely enclose coiled curtain and operating mechanism at opening head. Contour to fit end brackets to which hood is attached. Roll and reinforce top and bottom edges for stiffness. Form closed ends for surface-mounted hoods and fascia for any portion of between-jamb mounting that projects beyond wall face. Equip hood with intermediate support brackets as required to prevent sagging.

1. Galvanized Steel: Nominal 0.028-inch- (0.71-mm-) thick, hot-dip galvanized-steel sheet with G90 (Z275) zinc coating, complying with ASTM A653/A653M.

B. Removable Metal Soffit: Formed or extruded from same metal and with same finish as curtain if hood is mounted above ceiling unless otherwise indicated.

C. Mounting Frame: Manufacturer's standard mounting frame designed to support grille; factory fabricated from ASTM A36/A36M structural-steel tubes, hot-dip galvanized per ASTM A123/A123M; fastened to floor and structure above grille; to be built into wall construction; and complete with anchors, connections, and fasteners.

D. Push/Pull Handles: Equip push-up-operated or emergency-operated grille with lifting handles on each side of grille, finished to match grille.

2.7 COUNTERBALANCE MECHANISM

A. General: Counterbalance grilles by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.

B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless or welded carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of parts and to limit barrel deflection to not more than 0.03 in./ft. (2.5 mm/m) of span under full load.

C. Counterbalance Spring: One or more oil-tempered, heat-treated steel helical torsion springs. Size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

D. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

E. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.8 ELECTRIC GRILLE OPERATORS

A. General: Electric grille operator assembly of size and capacity recommended and provided by grille manufacturer for grille and operation cycles requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking grille, and accessories required for proper operation.

1. Comply with NFPA 70.
2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24-V ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each grille.

C. Grille Operator Location(s): Operator location indicated for each grille.
1. Front-of-Hood Mounted: Operator is mounted to the right or left grille head plate, with the operator on coil side of the grille-hood assembly and connected to the grille drive shaft with drive chain and sprockets. Front clearance is required for this type of mounting.

D. Motors: Reversible-type motor with controller (disconnect switch) for motor exposure indicated for each grille assembly.

1. Electrical Characteristics: Minimum as indicated for each grille assembly. If not indicated, large enough to start, accelerate, and operate grille in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.

2. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
3. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.

E. Limit Switches: Equip each motorized grille with adjustable switches interlocked with motor controls and set to automatically stop grille at fully opened and fully closed positions.

F. Obstruction-Detection Devices: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of grille opening. Activation of sensor immediately stops and reverses downward grille travel.

1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in grille opening without contact between grille and obstruction.

    a. Self-Monitoring Type: Designed to interface with grille operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, grille closes only with sustained or constant pressure on close button.

2. Electric Sensor Edge: Automatic safety sensor edge, located within astragal or weather stripping mounted to bottom bar. Contact with sensor activates device. Connect to control circuit using manufacturer's standard take-up reel or self-coiling cable.

    a. Self-Monitoring Type: Four-wire-configured device designed to interface with grille operator control circuit to detect damage to or disconnection of sensor edge.

3. Pneumatic Sensor Edge: Automatic safety sensor edge, located within astragal mounted to bottom bar. Contact with sensor activates device.

G. Control Station: Cylinder key activation of three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure push-button control labeled "Close."

1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.
2. Coordinate cylinder key with owners keying system.

H. Emergency Manual Operation: Equip electrically powered grille with capability for emergency manual operation. Design manual mechanism so required force for grille operation does not exceed 25 lbf (111 N).

I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

K. Audible and Visual Signals: Audible alarm and visual indicator lights in compliance with the accessibility standard.

L. Emergency-Egress Release: Flush, wall-mounted handle mechanism, for accessibility-code-compliant egress feature, not dependent on electric power. The release allows an unlocked grille to partially open without affecting limit switches to permit passage, and it automatically resets motor drive on return of handle to original position.

2.9 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.10 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.

B. Examine locations of electrical connections.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install overhead coiling grilles and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports, according to manufacturer's written instructions and as specified.

B. All guides shall be fully recessed in gypsum board walls.

C. Install overhead coiling grilles, hoods, controls, and operators at the mounting locations indicated for each grille.

D. Accessibility: Install overhead coiling grilles, switches, and controls along accessible routes in compliance with the accessibility standard.

3.3 STARTUP SERVICE

A. Engage a factory-authorized service representative to perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
3. Test grille opening when activated by detector, fire-alarm system, emergency-egress release, or self-opening mechanism as required. Reset grille-opening mechanism after successful test.

3.4 ADJUSTING

A. Adjust hardware and moving parts to function smoothly, so that grilles operate easily, free of warp, twist, or distortion.

1. Adjust exterior components to be weather resistant.

B. Lubricate bearings and sliding parts as recommended by manufacturer.

3.5 MAINTENANCE SERVICE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 12 months' full maintenance by skilled employees of coiling-grille Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper grille operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

1. Perform maintenance, including emergency callback service, during normal working hours.
2. Include 24-hour-per-day, 7-day-per-week, emergency callback service.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling grilles.

END OF SECTION 083326

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exterior storefront framing.
2. Interior butt-glazed storefront framing.
3. Storefront framing for window walls.
4. Storefront framing for punched openings.
5. Exterior manual-swing entrance doors and door-frame units.
6. Interior Glass Sliding Doors

B. Related Requirements:

1. Division 07 Section "Joint Sealers".
2. Division 08 Section "Glazing" for types of glazing required for field and factory installed glass.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:

a. Joinery, including concealed welds.
b. Anchorage.

c. Expansion provisions.
d. Glazing.
e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

E. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.

C. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.8 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
   1. Failures include, but are not limited to, the following:
      a. Structural failures including, but not limited to, excessive deflection.
      b. Noise or vibration caused by thermal movements.
      c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
      d. Adhesive or cohesive sealant failures.
      e. Water leakage through fixed glazing and framing areas.
      f. Failure of operating components.
   2. Warranty Period: 2 years from date of Substantial Completion.

B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.
   1. Warranty Period: 20 years from date of Substantial Completion for painted finishes.
   2. Warranty Period: 10 years from date of Substantial Completion for anodized finishes.

C. The warranty shall not deprive the Owner of other rights or remedies under other provisions of the Contract Documents and is in addition to other warranties under requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.

B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

   1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
   2. Failure also includes the following:

      a. Thermal stresses transferring to building structure.
      b. Glass breakage.
      c. Noise or vibration created by wind and thermal and structural movements.
      d. Loosening or weakening of fasteners, attachments, and other components.
      e. Failure of operating units.

C. Structural Loads:

   1. Basic Wind Speed: 90mph

2. Importance Factor: 1
3. Exposure Category: C

D. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.

    a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.

E. Structural: Test according to ASTM E 330 as follows:

1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
3. Test Durations: As required by design wind velocity, but not less than 10 seconds.

F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:

1. Fixed Framing and Glass Area:

    a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft..

2. Entrance Doors:

    a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
    b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..

G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft..

H. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

    a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.

b. Low Exterior Ambient-Air Temperature: 0 deg F.
c. Interior Ambient-Air Temperature: 75 deg F.

2.2 MANUFACTURERS

A. Storefront Basis-of-Design Product: Subject to compliance with requirements, provide exterior storefront Tri-Fab 451T CG (2 x 4 ½) and interior storefront VG 450 CG (1 ¾ x 4 ½) by Kawneer North America, Springdale, AR or comparable product by one of the following available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

1. EFCO Corporation.
2. Oldcastle BuildingEnvelope.
3. Tubelite.
4. United States Aluminum.

B. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing spandrel panels venting windows and accessories, from single manufacturer.

C. Interior Glass Sliding Doors Basis-of-Design Product: Rolmatic Glass Office Fronts by KLEIN USA Inc. Bi-parting top hung frameless glass doors with sidelights. Include all manufacturers standard components for a complete installation.

2.3 FRAMING

A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken .
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Finish: Clear anodic finish.
4. Fabrication Method: Field-fabricated stick system.

B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

a. Sheet and Plate: ASTM B 209.
b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
d. Structural Profiles: ASTM B 308/B 308M.

2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

    a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
    b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
    c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.4 ENTRANCE DOOR SYSTEMS

A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.

1. Door Construction: 2” overall thickness at exterior doors, 1-3/4-inch overall thickness interior, with minimum 0.125-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
2. Door Design: Wide stile; 5-inch nominal width.
3. Glazing Stops and Gaskets: Snap-on, extruded-aluminum stops and preformed gaskets.

    a. Provide nonremovable glazing stops on outside of door.

2.5 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 DOOR HARDWARE

B. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door to comply with requirements in this Section.

1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated.
2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
3. Opening-Force Requirements:

    a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion and not more than 15 lbf to open the door to its minimum required width.
    b. Accessible Interior Doors: Not more than 5 lbf to fully open door.

C. Pivot Hinges: Manufacturer's standard

D. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.

E. Manual Flush Bolts: BHMA A156.16, Grade 1.

F. Automatic and Self-Latching Flush Bolts: BHMA A156.3, Grade 1.

G. Panic Exit Devices: Per spec Section 087100 “Door Hardware.”

H. Push/Pull: Manufacturer's standard round bar. Pulls shall be 18" long with 90 degree offset.

I. Cylinders: As specified in Section 087100 "Door Hardware." BHMA A156.5, Grade 1.

1. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation to be furnished by Owner.

J. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing unless noted otherwise in hardware sets.

K. Operating Trim: BHMA A156.6.

L. Removable Mullions: BHMA A156.3, extruded aluminum.

1. When used with panic exit devices, provide removable mullions listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305. Use only mullions that have been tested with exit devices to be used.

M. Closers: Per spec Section 087100 "Door Hardware", with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.

N. Concealed Overhead Holders: BHMA A156.8, Grade 1.

O. Surface-Mounted Holders: BHMA A156.16, Grade 1.

P. Weather Stripping: Manufacturer's standard replaceable components.

1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

Q. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.

R. Silencers: BHMA A156.16, Grade 1.

S. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

T. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.6 INTERIOR GLASS SLIDING DOORS HARDWARE

A. Included with installation kit: 4 pressure clamps with rollers, Stopper-brakes, 2 guides, bottom extrusion for fixed side panels, upper track with valance

B. Pulls: Provide 48" Locking Ladder Pull handles by T Concept Solutions. Coordinate Glass Cut-out with glass door fabricator.

2.7 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

2.8 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, non-staining, nonbleeding flashing compatible with adjacent materials.

D. Provide high performance sub-sill with end dams.

E. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-milthickness per coat.

2.9 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

F. Storefront Framing: Fabricate components for assembly using shear-block system or screw-spline system head-and-sill-receptor system with shear blocks at intermediate horizontal members.

G. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.

H. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

I. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.

J. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.10 ALUMINUM FINISHES

A. Clear Anodic Finish AAMA 611: Exterior - AA-M12C22A41, Class I: Interior – AA-M10C21A31, Class II

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "Joint Sealants" to produce weathertight installation.

D. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

E. Install glazing as specified in Section 088000 "Glazing."

F. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.3 ERECTION TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:

    a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
    b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
    c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.

4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.
5. Fit: Provide a perimeter joint of ¼” to 1/2” in width for field applied sealant.

3.4 MAINTENANCE SERVICE

A. Entrance Door Hardware:

1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.

2. Initial Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

END OF SECTION 084113

SECTION 084136 – ALL GLASS DOOR DISPLAY CASE SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Swinging all-glass display case doors.
2. Sliding all-glass display case doors.
3. Fixed display case.
4. Display case suspended shelving system.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for all-glass system.

B. Shop Drawings: For all-glass doors, displays and shelf support system.

1. Include plans, elevations, and sections.
2. Include details of fittings and glazing, including isometric drawings of rail fittings.
3. Door hardware locations, mounting heights, and installation requirements.

C. Samples for Initial Selection: For each type of exposed finish indicated.

D. Samples for Verification: For each type of exposed finish indicated, prepared on Samples of size indicated below.

1. Metal Finishes: 6-inch- (150-mm-) long sections of rail fittings, accessory fittings, and other items.
2. Glass: 6 inches (150 mm) square, showing exposed-edge finish.
3. Door Hardware: For exposed door hardware of each type, in specified finish, full size.

E. Fabrication Sample: Continuous rail fitting at top and bottom, made from 12-inch (300-mm) lengths of full-size components and showing details of the following:

1. Joinery.
2. Anchorage.
3. Glazing.

F. Display Case Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of display case door hardware, as well as procedures and diagrams. Coordinate final door hardware schedule with doors, display case and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

G. Delegated-Design Submittal: For all-glass systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For all-glass systems, for tests performed by manufacturer and witnessed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For all-glass systems to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.8 MOCKUPS

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1. Build mockup of each type of all-glass system to include shelving as shown on Drawings.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 WARRANTY

A. Special Warranty: Manufacturer and Installer agrees to repair or replace components of all-glass systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
b. Failure of operating components.

2. Warranty Period: Two years from date of Substantial Completion**.**

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01400 "Quality Requirements," to design all-glass entrances.

B. General Performance: Comply with performance requirements specified, as determined by testing of all-glass entrances representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

C. Structural Loads:

1. Design Loads: As defined by delegated design engineer.
2. Deflection Limits: Deflection normal to glazing plane is limited to 1/175 of clear span or 3/4 inch (19 mm), whichever is smaller.

D. Seismic Performance: All-glass doors shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

E. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.

1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 DISPLAY CASE SWINGING DOOR SYSTEM

A. Products: Subject to compliance with requirements, provide Display Case Swinging Door System products as indicated in the drawings.

1. Display Case Swinging Door System manufactured by other manufacturers may be considered, provided deviations in project performance, recycled content, details, dimensions, textures, style, patterns and colors are minor and do not change the design concept as judged by the Architect. The burden of proof is on the proposer.

2.3 DISPLAY CASE SLIDING DOOR SYSTEM

A. Products: Subject to compliance with requirements, provide Display Case Sliding Door System products as indicated in the drawings.

1. Display Case Sliding Door System manufactured by other manufacturers may be considered, provided deviations in project performance, recycled content, details, dimensions, textures, style, patterns and colors are minor and do not change the design concept as judged by the Architect. The burden of proof is on the proposer.

2.4 DISPLAY CASE FIXED SYSTEM

A. Products: Subject to compliance with requirements, provide Display Case Fixed System products as indicated in the drawings.

1. Display Case Fixed System manufactured by other manufacturers may be considered, provided deviations in project performance, recycled content, details, dimensions, textures, style, patterns and colors are minor and do not change the design concept as judged by the Architect. The burden of proof is on the proposer.

2.5 DISPLAY CASE SUSPENDED SHELVING SYSTEM

A. Products: CR Laurence Cable Display System Y0003CR cable kit for 1/2" glass shelves and CRL Shelf Connectors Y01CR and Y02CR.

1. Shelving System manufactured by other manufacturers may be considered, provided deviations in project performance, recycled content, details, dimensions, textures, style, patterns and colors are minor and do not change the design concept as judged by the Architect. The burden of proof is on the proposer.

2.6 METAL COMPONENTS

A. Fitting Configuration:

1. Manual-Swinging, All-Glass Doors: Fitting at top and bottom as shown on the drawings.
2. Manual-Sliding, All-Glass Doors: Fitting at top and bottom as shown on the drawings.
3. Fixed, All-Glass Display: Fitting at top and bottom as shown on the drawings.
4. Suspended glass shelves: Fixed at top and bottom with hardware attachments to shelves.

B. Patch Fittings: Stainless-steel-clad aluminum.

C. Cables: Stainless steel as required for application.

D. Rail Fittings:

1. Material: Stainless-steel.
2. Height: 1 5/8” or as indicated on the drawings.

    a. Top Rail: As indicated on the drawings.
    b. Bottom Rail: As indicated on the drawings.

3. Profile: Square.
4. End Caps: Manufacturer's standard precision-fit end caps for rail fittings.

E. Accessory Fittings: Match rail-fitting metal and finish for the following:

1. Overhead doorstop.
2. Center-housing lock.
3. Glass-support-fin brackets.

F. Anchors and Fastenings: Concealed.

G. Materials:
1. Stainless-Steel: ASTM A 666, Type 304.

    a. Finish: No. 4 directional satin finish.

2.7 GLASS

A. Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated surfaces), Type I (transparent), tested for surface and edge compression per ASTM C 1048 and for impact strength per 16 CFR 1201 for Category II materials.

1. Products: Subject to compliance with requirements, provide Glass products as indicated in the drawings.

    a. Glass manufactured by other manufacturers may be considered, provided deviations in project performance, recycled content, details, dimensions, textures, style, patterns and colors are minor and do not change the design concept as judged by the Architect. The burden of proof is on the proposer.

2. Exposed Edges: Machine ground and flat polished.
3. Butt Edges: Machine ground and flat polished.
4. Corner Edges: Lap-joint corners with exposed edges polished.

2.8 DISPLAY CASE DOOR HARDWARE

A. Products: Subject to compliance with requirements, provide Hardware products as indicated in the drawings.

1. Hardware manufactured by other manufacturers may be considered, provided deviations in project performance, recycled content, details, dimensions, textures, style, patterns and colors

are minor and do not change the design concept as judged by the Architect. The burden of proof is on the proposer.

B. Cylinders: As provided by the hardware rail manufacturer for sliding and swinging doors.

2.9 FABRICATION

A. Provide holes and cutouts in glass to receive hardware, fittings, and accessory fittings before tempering glass. Do not cut, drill, or make other alterations to glass after tempering.

1. Fully temper glass using horizontal (roller-hearth) process, and fabricate so that when glass is installed, roll-wave distortion is parallel with bottom edge of door or lite.

B. Factory assemble components and factory install hardware and fittings to greatest extent possible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install all-glass systems and associated components according to manufacturer's written instructions.

B. Set units level, plumb, and true to line, with uniform joints.

C. Maintain uniform clearances between adjacent components.

D. Lubricate hardware and other moving parts according to manufacturer's written instructions.

E. Set, seal, and grout floor closer cases as required to suit hardware and substrate indicated.

3.3 ADJUSTING AND CLEANING

A. Adjust all glass doors to produce smooth operation and tight fit at contact points and weather stripping.

1. For all-glass doors accessible to people with disabilities, adjust closers to provide a three-second closer sweep period for doors to move from a 70-degree open position to 3 inches (75 mm) from the latch measured to the leading door edge.

B. Remove excess sealant and glazing compounds and dirt from surfaces.

END OF SECTION 084136

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Mechanical door hardware for the following:

a. Swinging doors.

2. Cylinders for door hardware specified in other Sections.

1.3 COORDINATION

A. Floor-Recessed Door Hardware: Coordinate layout and installation with floor construction.

1. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

E. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site.

1. Conference participants shall include Installer's Architectural Hardware Consultant, Electrician, Low Voltage installer, and Owner's security consultant.

2. Coordinate the installation of the electrified hardware to ensure that each trade is fully aware of the required scope and sequencing of work.

B. Keying Conference: Conduct conference at Project site.

1. Conference participants shall include Installer's Architectural Hardware Consultant and Owner's security consultant.
2. Incorporate conference decisions into keying schedule after reviewing door hardware keying system including, but not limited to, the following:

a. Flow of traffic and degree of security required.

b. Preliminary key system schematic diagram.

c. Requirements for key control system.

d. Requirements for access control.

e. Address for delivery of keys.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

C. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

D. Deliver keys to Owner by registered mail or overnight package service.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Structural failures including excessive deflection, cracking, or breakage.

b. Faulty operation of doors and door hardware.

c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.

2. Warranty Period: Three years from date of Substantial Completion unless otherwise indicated below:

a. Electromagnetic and Delayed-Egress Locks: Five years from date of Substantial Completion.

3. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of door hardware from single manufacturer.

2.2 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as scheduled on drawings under "Door Hardware Schedule" to comply with requirements in this Section.

1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.

2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

B. Designations: Requirements for design, function, finish, and other distinctive qualities of each type of door hardware are indicated in "Door Hardware Schedule". Products are identified by using door hardware designations, as follows:

1. Number: The number indicates the total number of items required for each set of hardware.

2. Description: The product and function are listed, along with additional specifics that may be relevant to the particular device.

3. All other requirement for the hardware are outlined in the specifications as follows:
4. Basis of Design Products: Where Specifications name a product, or refer to a scheduled product and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
   1) Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents, and that it will produce the indicated results, and that it is compatible with other portions of the Work.
   2) Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements.
   3) Evidence that proposed product provides specified warranty.
   4) List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
   5) Samples, if requested.

5. Product, Manufacturer: Where Specifications name a single product and manufacturer, provide the named product that complies with requirements. Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
6. Catalog Number: Installer shall determine specific catalog number required, including all required accessories for desired function, and shall provide information in the submittal

2.3 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames.

B. Continuous Hinges: BHMA A156.26; minimum 0.120-inch-thick, hinge leaves with minimum overall width of 4 inches; fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.

C. Continuous, Gear-Type Hinges: 6063-T6 Extruded-aluminum, pinless, geared hinge leaves joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.

1. On fire-rated doors, provide aluminum geared continuous hinges that are classified for use on rated doors by a testing agency acceptable to the authority having jurisdiction.

2. Provide aluminum geared continuous hinges with factory fabricated cut outs for electrified power transfer where specified.

D. Basis-of-Design Products: Subject to compliance with requirements, provide scheduled product manufactured by IVES Hardware; Allegion, PLC, or a comparable product by:

1. Hager Companies.

2. McKinney Products Company; an ASSA ABLOY Group company.

3. Stanley Commercial Hardware; Div. of The Stanley Works.

2.4 ELECTRIC POWER TRANSFER

A. Manufacturer: Subject to compliance with requirements, provide scheduled product manufactured by Von Duprin; Allegion, PLC, (VON)

B. Provide power transfer sufficient for number and gage of wires to accommodate electric function of specified hardware.

C. Locate electric power transfer per manufacturer’s template and UL requirements.

2.5 MECHANICAL LOCKS AND LATCHES

A. Bored Locks: BHMA A156.2; Grade 1; Series 4000, except tested to exceed 3,000,000 cycles.

B. Deadbolts: For storefront applications provide MS1850S Series MS Deadlock or equal.

C. Product: Subject to compliance with requirements, provide ND Series Latchsets and Locksets manufactured by Schlage Lock Company, Allegion, PLC.

1. Substitution product: not allowed

D. Requirements:

1. Latchbolt: Steel with minimum ½" throw deadlatch on keyed and exterior functions; ¾" throw anti-friction latchbolt on pairs of doors.

2. Strikes: Provide manufacturer's standard strike, ANSI curved lip, 1 ¼" x 4 7/8", 16 gauge, with 1" deep box construction, for each lock bolt or latchbolt, except where noted otherwise.

3. Lever and Trim: Lever shall be type ATH

2.6 PUSH/PULL DEVICES

A. Push Plates: Product shall be Rockwood 71RCB or equal

B. Pull Bars: Product shall be Rockwood BF159 Heavy Duty 18" Offset pull or equal

2.7 LOCK CYLINDERS/CORES

A. Lock Cylinders/Cores: Interchangeable core type, constructed from brass or bronze, stainless steel, or nickel silver.

1. Product: Provide Schlage FSIC with Everest 29 Keyway. Coordinate with owner's existing keying system.

2. Cores/keys are to be factory pinned, cut, and masterkeyed, and shipped directly to owner for installation by maintenance personnel.

3. Contractor to provide temporary construction cores where required to secure finished work or building entrances.

2.8 THUMB TURN OCCUPANCY INDICATOR

A. Thumb Turn deadbolt with occupancy indicator: Provide Falcon D271 thumb turn deadbolt (inside with occupancy indicator"

2.9 KEYING

A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Match owner's existing keying, and incorporate decisions made in keying conference. Obtain final instructions in writing. Provide the type required (master, grandmaster, or great-grandmaster). Coordinate with Owner for District pinning matrix.

B. Provide individual change key for each lock which is not designated to be keyed alike with a group of related locks. Permanently inscribe each key with number or lock that identifies cylinder manufacturer key symbol and notation "DO NOT DUPLICATE."

C. Key Material: Provide keys of nickel silver only.

D. Key Quantity: Furnish three change keys for each lock; five master keys for each master system; and five grandmaster keys for each grandmaster system.

2.10 EXIT DEVICES AND AUXILIARY ITEMS

A. Exit Devices and Auxiliary Items: BHMA A156.3. Grade 1; except with extended cycle performance testing certified for minimum 8,000,000 cycles; listed by UL for accident and hazard; and conforming to applicable requirements of NFPA 80 and NFPA 101.

1. Product (Owner Standard): Subject to compliance with requirements, provide scheduled products series 98 concealed vertical rod or rim devices manufactured by Von Duprin; Allegion, PLC. Where required, include lever type 07.

2. Requirements:
   1) Internal springs: Coil compression type
   2) Provide security dead latching for active latch bolts
   3) Latch Bolts: Self-lubricating coating to reduce friction and wear. Plated latch bolts are not acceptable.
   4) Touch Pad: Stainless steel with return stroke fluid dampers and rubber bottoming dampers.
   5) Provide Keyed cylinder dogging
   6) Provide filler plates and shim kits as needed for flush mounting of devices on doors.
   7) Devices with exposed rivets or screws on back of device that would be visible through a glass light are not acceptable.
   8) Provide dust-proof strikes for foot bolts, except where special threshold construction provides non-recessed strike for bolt.

2.11 SURFACE CLOSERS

A. Surface Closers: BHMA A156.4 Grade 1; except tested to exceed 10 million (10,000,000) full load operating cycles by an independent test laboratory;

1. Product: Subject to compliance with requirements, provide 4050 Series manufactured by LCN Closers; Allegion, PLC.
   1) Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use.
   2) Provide factory-sized rack-and-pinion hydraulic type closers that are adjustable to meet field conditions and requirements for opening force.
   3) Provide closers, constructed with high strength cast iron cylinders, forged main arms, and one piece forged steel pistons, with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm.
   4) Cylinder Body: 1½" piston diameter with 3/4" journal double heat treated shaft, 5/8" full complement bearing, chrome silicon steel spring.
   5) Hydraulic Fluid: ULTRA X ™ fluid with constant temperature control from +120° F (49° C) to -30° F (–35° C).
   6) Closers with pressure release valves are not acceptable.

2.12 DOOR OPERATOR

A. Product: Automatic Door Operator by Stanly Access Technologies; Magic-Access Series door operator.

B. General: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated. Include all required accessories, controls, power supply, etc. to provide a complete and fully functional door operator.

C. Operators: Self-contained units powered by a minimum fractional horsepower, permanent-magnet DC motors.
   1. Electro-mechanical Operator: Transmit power from operator to door through reduction gear train, splined spindle, door arm, and linkage assembly. Drive train shall have positive constant engagement.
   2. Operation: Power opening and spring closing.
   3. Capacity: Rated for door panels weighing up to 125 lb (57 kg)
   4. Mounting: Visible
   5. Features:
      1) Adjustable opening, open check, and closing speeds.
      2) Adjustable opening force.
      3) Adjustable hold-open time between 0 and 30 seconds.
      4) Reverse on obstruction.
      5) Push to operate activation. Include square wall mount press switch and stainless steel post mount buttons.
   6. Closing Operation: The operator shall close the door by spring energy employing the motor, as a dynamic brake to provide closing speed control. The closing spring shall be adjustable for positive closing action at a low material stress level for long spring life.
   7. Manual Use: The operator shall function as a manual door closer in the direction of swing with or without electrical power. The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open.

   8. Electrical service to door operators shall be provided under Division 16 Electrical. Minimum service to be 120 VAC, 5 amps.

2.13 POWER SUPPLIES

A. Products: Schlage Electronics PS900 series or Von Duprin PS914 series, as appropriate for the application

B. Requirements:

   1. Provide power supplies complete with required circuit boards, recommended and approved by the manufacturer of the electrified locking component, for the operation of electrified locks, electrified exit devices, magnetic locks, electric strikes, and other components requiring a power supply.

   2. Provide the appropriate quantity of power supplies necessary for the proper operation of the electrified locking components as recommended by the manufacturer of the electrified locking components with consideration for each electrified component using the power supply, the location of the power supply, and the approved wiring diagrams. Locate the power supplies as directed by the Architect.

   3. Provide a power supply that is regulated and filtered 12 VDC, or as required, and UL class 2 listed.

2.14 ELECTRIC STRIKE

A. Electric Strikes: BHMA A156.8.

   1. Subject to compliance with requirements, provide heavy duty product manufactured by Hess suitable for the application, series 9400 for exit devices and series 7000 for locksets. No substitutions allowed.

2.15 MECHANICAL STOPS AND HOLDERS

A. Wall- and Floor-Mounted Stops: BHMA A156.16.

1. Basis-of-Design Product: Subject to compliance with requirements, provide the following product manufactured by IVES Hardware; Allegion, PLC, or a comparable product by:
   1) Hager Companies.
   2) Rockwood Manufacturing Company.

B. Provide door stops for all doors in accordance with the following requirements:

1. Provide convex type wall stops wherever possible, WS401CVX.

2. Where wall stops cannot be used, provide floor stops of the proper height, FS13

2.16 OVERHEAD STOPS AND HOLDERS

A. Overhead Stops and Holders: BHMA A156.8.

1. Basis-of-Design Product: Subject to compliance with requirements, provide heavy duty product manufactured by Glynn-Johnson; Allegion, PLC, or comparable product by one of the following:
   1) Architectural Builders Hardware Mfg., Inc.
   2) Rockwood Manufacturing Company.

2.17 FLUSH BOLTS

A. Flush Bolts: BHMA A156.16.

1. Basis-of-Design Product: Subject to compliance with requirements, provide heavy duty flush bolts by Ives, or comparable product:
   1) Manual flush bolt FB457 for metal doors, FB358 for wood doors
   2) Automatic flush bolt FB41P for metal doors, FB41P for wood doors
   3) Constant latching flush bolt FB51P for metal doors, FB61P for wood doors

2.18 DOOR GASKETING

A. Perimeter Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot of crack length for gasketing, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

B. Acoustical Seals: Full perimeter seals tested in accordance with AST E90 and E4113; basis of design Pemko S773

1. Manufacturers: Subject to compliance with requirements, provide the scheduled product or comparable product by one of the following:
   1) Pemko
   2) Hager Companies.
   3) National Guard Products.
   4) Reese Enterprises, Inc.
   5) Zero International.

2.19 THRESHOLDS

A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, provide ADA compliant Thermal Barrier Threshold product by one of the following:
   1) Pemko
   2) Hager Companies.
   3) National Guard Products.
   4) Reese Enterprises, Inc.
   5) Zero International.

2.20 ASTRAGAL

A. Split Astragal: fabricated to full width of height indicated. NON-FACE MOUNTED

1. Manufacturers: Subject to compliance with requirements, provide Zero 56AA on one leaf and Zero 557AA on the other leaf. Face mounted astragals are NOT permitted.

2.21 DOOR BOTTOM

A. Automatic Door Bottoms: BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, provide Pemko fully mortised 411_NBL drop-bar seal actuation product or comparable product. (Where fully mortised is not possible, use seim-mortised Pemko 430_MRL.

2.22 DOOR TOP WEATHERSTRIP

A. Continuous Door Top Weatherstrip: continuous across face of frame extended to edge of jambs

1. Manufacturers: Provide Pemko 346_Door Top Weatherstrip or equal

2.23 FABRICATION

A. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.

2. Spacers or Sex Bolts: For through bolting of hollow-metal doors.

3. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.24 FINISHES

A. Provide finishes complying with BHMA A156.18

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance of the Work.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Steel Doors and Frames: For surface-applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.

B. Wood Doors: Comply with door and hardware manufacturers' written instructions.

3.3 INSTALLATION

A. Mounting Heights: Mount door hardware units at heights indicated on Drawings unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.

2. Custom Steel Doors and Frames: HMMA 831.

3. Wood Doors: DHI's "Recommended Locations for Architectural Hardware for Wood Flush Doors."

B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.

2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

C. Intermediate Offset Pivots: Where offset pivots are indicated, provide intermediate offset pivots in quantities indicated in door hardware schedule, but not fewer than one intermediate offset pivot per door and one additional intermediate offset pivot for every 30 inches of door height greater than 90 inches .

D. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings.

1. Configuration: Provide one power supply for each door opening with electrified door hardware.

E. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

F. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

1. Do not notch perimeter gasketing to install other surface-applied hardware.

G. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

H. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ACCESS CONTROL INSTALLATION

A. Comply with recommendations in SIA CP-01.

B. Comply with TIA/EIA 606-A, "Administration Standard for Commercial Telecommunications Infrastructure."

C. Examine pathway elements intended for cables. Check raceways, cable trays, existing cables and connections to be reused, and other elements for compliance with space allocations, installation tolerances, hazards to cable installation, and other conditions affecting installation.

D. Examine roughing-in for LAN and control cable conduit systems to PCs, controllers, readers, and other cable-connected devices to verify actual locations of conduit and back boxes before device installation.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

B. Tests and Inspections: After installation of cables and connectors, demonstrate product capability and compliance with requirements. Test each signal path for end-to-end performance from each end of all pairs installed. Remove temporary connections when tests have been satisfactorily completed.

3.6 ADJUSTING

A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

2. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 70 degrees and so that closing time complies with accessibility requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately **six** months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.7 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.8 MAINTENANCE SERVICE

A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

B. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include **six** months' full maintenance by skilled employees of door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door and door hardware operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.9 DEMONSTRATION

A. Engage Installer to train Owner's maintenance personnel to adjust, operate, and maintain door hardware.

END OF SECTION 087100

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Glass for windows, doors, interior borrowed lites, storefront framing, and butt glazing.
2. Glazing sealants and accessories.
3. **Back Painted Marker Glass**

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches square.

1. Tinted glass.
2. Coated glass.
3. Laminated glass.
4. Insulating glass.
5. Spandrel Insulating Glass

C. Glazing Accessory Samples: For sealants and colored spacers, in 12-inch lengths.

D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

E. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturers of insulating-glass units with sputter-coated, low-E coatings.

B. Product Certificates: For glass.

C. Product Test Reports: For tinted glass, coated glass, insulating glass, and glazing sealants, for tests performed by a qualified testing agency.

1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved, and certified by coated-glass manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Product: Insulated glass scheduled based on Vitro (Formerly PPG) Subject to compliance with requirements, provide product indicated in glass schedules or comparable product by one of the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

1. AGC Glass Company North America, Inc.
2. Cardinal Glass Industries.
3. Guardian Industries Corp.; SunGuard.
4. Oldcastle Building Envelope.
5. Pilkington North America.
6. Vitro (formerly PPG Industries, Inc.)
7. Vetrotech Saint-Gobain.

B. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.

1. Obtain tinted glass from single source from single manufacturer.
2. Obtain reflective-coated glass from single source from single manufacturer.

C. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.

C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.

1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.

   a. Basic Wind Speed: 90 mph
   b. Importance Factor: 1
   c. Exposure Category: C

2. Design Snow Loads: 20 psf or ss indicated on Drawings.
3. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
4. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
5. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
6. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

D. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites of thickness indicated.
2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F.
4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.

1. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.

E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

A. Tinted Annealed Float Glass: ASTM C 1036, Type I, Class 2 (tinted), Quality-Q3.

B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

C. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.

1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

D. Ceramic-Coated Spandrel Glass: ASTM C 1048, Type I, Condition B, Quality-Q3.

E. Silicone-Coated Spandrel Glass: ASTM C 1048, Type I, Condition C, Quality-Q3.

1. Basis-of-Design Product: water-based silicone, Opaci-Coat 300 by ICD High Performance Coating, on #4 surface. Use only neutral curing sealants and do not use neoprene setting blocks.

2.5 INSULATING GLASS

A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.

1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.

2. Perimeter Spacer: Manufacturer's standard spacer material and construction.

3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.6 GLAZING SEALANTS

A. General:

1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. Manufacturers:Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

a. Dow Corning Corporation.
b. GE Construction Sealants; Momentive Performance Materials Inc.
c. May National Associates, Inc.; a subsidiary of Sika Corporation.
d. Pecora Corporation.
e. Sika Corporation.
f. Tremco Incorporated.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 GLASS PAINTED MARKER GLASS

A. This section includes the requirements for all back painted marker glass

B. Basis of design: Subject to compliance with requirements as manufactured by National Glass Products; Chrismacolor Painted Glass or comparable product by one of the following.

1. Clarus
2. Square One Studio

C. All Edges to be finished with a flat polished edge treatment and with coatings covering the back areas of the flat polished edge to minimize visible butt joints.

D. Product should meet or exceed the following tests;

1. ASTM D 3363 – Film hardness by pencil test
2. ASTM D 4587 & ASTM 2244 – UV exposure & color difference test
3. ASTM 3359 – Adhesion by tape test
4. ASTM B 117 – Salt fog exposure test
5. ASTM C 650 – Resistance to chemical substance test
6. AAMA 800 – Compatibility test for adhesive

E. All installations must be completed in accordance with manufacturers written instructions.

2.9 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.10 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.

a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:

1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches.

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.4 TAPE GLAZING

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 SEALANT GLAZING (WET)

A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.7 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.

1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.8 MONOLITHIC GLASS SCHEDULE

A. Glass Type: GL-1 Clear heat-strengthened safety glass.

1. Minimum Thickness: 1/4 inch.
2. Fully tempered Safety glazing required.

B. Glass Type: GL-2 Clear heat-strengthened safety glass.

1. Minimum Thickness: 3/8 inch.
2. Fully tempered Safety glazing required.

3.9 INSULATING GLASS SCHEDULE

A. Glass Type: GL-3 Low-E-coated, insulating safety glass.

1. Basis-of-Design Product: “Acuity” with Low-E coating Solarban 90 (2) and “Acuity.”
2. Overall Unit Thickness: 1 inch.
3. Minimum Thickness of Each Glass Lite: 1/4 inch .
4. Outdoor Lite: Tinted fully tempered safety glass.
5. Tint Color: none
6. Interspace Content: Air.
7. Indoor Lite: “Acuity” fully tempered safety glass.
8. Low-E Coating: Pyrolytic on second surface.
9. Winter Nighttime U-Factor: 0.28 maximum.
10. Summer Daytime U-Factor: 0.29 maximum.
11. Visible Light Transmittance: 53% percent minimum.
12. Solar Heat Gain Coefficient: .23 maximum.
13. Safety glazing required.

B. Glass Type: GL-4 Low-E-coated, insulating glass.

1. Basis-of-Design Product: “Acuity” with Low-E coating Solarban 90 (2) and “Acuity.”
2. Overall Unit Thickness: 1 inch.
3. Minimum Thickness of Each Glass Lite: 1/4 inch .
4. Outdoor Lite: Tinted float glass.
5. Tint Color: none
6. Interspace Content: Air.
7. Indoor Lite: Acuity.
8. Low-E Coating: Pyrolytic on second surface.
9. Winter Nighttime U-Factor: 0.28 maximum.
10. Summer Daytime U-Factor: 0.29 maximum.
11. Visible Light Transmittance: 53% percent minimum.

12. Solar Heat Gain Coefficient: .23 maximum.

C. Glass Type: GL-5: Ceramic-coated or Silicone-coated, tinted, insulating spandrel glass.

1. Basis-of-Design Product: Same as above only Spandrel type.
2. Coating Color: As selected by Architect from manufacturer's full range.
3. Overall Unit Thickness: 1 inch.
4. Minimum Thickness of Each Glass Lite: 1/4 inch .
5. Outdoor Lite: Tinted fully tempered float glass.
6. Tint Color: none
7. Interspace Content: Air.
8. Indoor Lite: Clear fully tempered float glass.
9. Coating Location: Fourth surface.

END OF SECTION 088000

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Non-load-bearing steel framing systems for interior partitions.
2. Suspension systems for interior ceilings and soffits.
3. Grid suspension systems for gypsum board ceilings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 INFORMATIONAL SUBMITTALS

A. Evaluation Reports: For embossed steel studs and tracks firestop tracks post-installed anchorsand power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

C. Horizontal Deflection: For wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft..

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.

1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
2. Protective Coating: ASTM A 653/A 653M, G40, hot-dip galvanized unless otherwise indicated.

B. Studs and Tracks: ASTM C 645. Use either steel studs and tracks or embossed steel studs and tracks.

1. Steel Studs and Tracks:

a. Minimum Base-Metal Thickness: 0.0269 inch.
b. Depth: As indicated on Drawings.

2. Embossed Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally equivalent to conventional ASTM C 645 steel studs and tracks.

a. Manufacturers:Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

1) ClarkDietrich Building Systems.
2) MarinoWARE.

b. Minimum Base-Metal Thickness: As required by horizontal deflection performance requirements.
c. Depth: As indicated on Drawings.

C. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Single Long-Leg Track System: ASTM C 645 top track with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
2. Double-Track System: ASTM C 645 top outer tracks, inside track with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
3. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.

a. Products: available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

1) ClarkDietrich Building Systems; SLP-TRK Slotted Deflection Track.

D. Firestop Tracks: Top track manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.

1. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

    a. ClarkDietrich Building Systems; BlazeFrame.
    b. Fire Trak Corp; Fire Trak System attached to studs with Fire Trak Posi Klip.
    c. Steel Network, Inc. The VertiClip SLD Series.

E. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.

1. Minimum Base-Metal Thickness: 0.0269 inch.

F. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-metal thickness, with minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings or 1-1/2 inches.
2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.

G. Hat-Shaped, Rigid Furring Channels: ASTM C 645.

1. Depth: As indicated on Drawings.

H. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.

1. Configuration: Asymmetrical.

I. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings.
2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

J. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-metal thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.

B. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.

C. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-metal thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.

1. Depth: As indicated on Drawings.

D. Furring Channels (Furring Members):

1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges, 3/4 inch deep.
2. Steel Studs and Tracks: ASTM C 645.

    a. Minimum Base-Metal Thickness: 0.0269 inch.
    b. Depth: As indicated on Drawings.

3. Embossed Steel Studs and Tracks: ASTM C 645.

    a. Minimum Base-Metal Thickness: As indicated on Drawings 0.0190 inch.
    b. Depth: As indicated on Drawings.

4. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.

    a. Minimum Base-Metal Thickness: 0.0296 inch.

5. Resilient Furring Channels: 1/2-inch- deep members designed to reduce sound transmission.

    a. Configuration: Asymmetrical hat shaped.

E. Grid Suspension System for Gypsum Board Ceilings: ASTM C 645, direct-hung system composed of main beams and cross-furring members that interlock.

1. Products: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

    a. Chicago Metallic Corporation; 640/660 Drywall Ceiling Suspension.
    b. United States Gypsum Company; Drywall Suspension System.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D 226/D 226M, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:

1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling tracks to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that are required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.

C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

D. Install bracing at terminations in assemblies.

E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Single-Layer Application: As required by horizontal deflection performance requirements unless otherwise indicated.
2. Multilayer Application: As required by horizontal deflection performance requirements unless otherwise indicated.
3. Tile Backing Panels: As required by horizontal deflection performance requirements unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.

1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.

    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.

    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.

5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:

    a. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
    b. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

E. Direct Furring:

1. Screw to wood framing.

2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.

1. Hangers: 48 inches o.c.
2. Carrying Channels (Main Runners): 48 inches o.c.
3. Furring Channels (Furring Members): 24 inches o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.

    a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.

    a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.

3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Do not attach hangers to steel roof deck.

5. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
6. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

Section Includes:

Interior gypsum board.

1. Exterior gypsum board for ceilings and soffits.
2. Tile backing panels.

Related Requirements:

Section 061600 "Sheathing" for gypsum sheathing for exterior walls.

3. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.
4. Section 093013 "Ceramic Tiling" for cementitious backer units installed as substrates for ceramic tile.

1.3 ACTION SUBMITTALS

Product Data: For each type of product.

1.4 DELIVERY, STORAGE AND HANDLING

Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

A. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

B. Do not install panels that are wet, moisture damaged, and mold damaged.

Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

1. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

B. Ceiling and wall materials shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 GYPSUM BOARD, GENERAL

Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

Gypsum Wallboard: ASTM C 1396/C 1396M.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

American Gypsum.

a. CertainTeed Corporation.
b. Georgia-Pacific Building Products.
c. National Gypsum Company.
d. Temple-Inland Building Products by Georgia-Pacific.
e. USG.

Gypsum Board, Type X: ASTM C 1396/C 1396M.

Thickness: 5/8 inch .

2. Long Edges: Tapered.

Flexible Gypsum Board: ASTM C 1396/C 1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.

Thickness: 1/4 inch .

3. Long Edges: Tapered.

Gypsum Ceiling Board: ASTM C 1396/C 1396M.

Thickness: 1/2 inch .

4. Long Edges: Tapered.

Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M. With moisture- and mold-resistant core and paper surfaces.

Core: As indicated 1/2 inch , regular type 5/8 inch , Type X.

5. Long Edges: Tapered.
6. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

CertainTeed Corporation.

a. Georgia-Pacific Building Products.
b. National Gypsum Company.
c. Temple-Inland Building Products by Georgia-Pacific.
d. United States Gypsum Company.

Core: As indicated 1/2 inch , regular type 5/8 inch , Type X.

2.5 TILE BACKING PANELS

Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

CertainTeed Corporation.

a. Georgia-Pacific Building Products.
b. National Gypsum Company.
c. Temple-Inland Building Products by Georgia-Pacific.

Core: 5/8 inch , Type X.

2. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

Cementitious Backer Units: ANSI A118.9 and ASTM C 1288 or ASTM C 1325, with manufacturer's standard edges.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

C-Cure.

a. CertainTeed Corporation.
b. Custom Building Products.
c. FinPan, Inc.
d. James Hardie Building Products, Inc.
e. National Gypsum Company.
f. United States Gypsum Company.

Thickness: 5/8 inch .

3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

Water-Resistant Gypsum Backing Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

American Gypsum.

a. CertainTeed Corporation.
b. Continental Building Products, LLC.
c. Georgia-Pacific Building Products.
d. PABCO Gypsum.
e. Temple-Inland Building Products by Georgia-Pacific.
f. United States Gypsum Company.

Core: 5/8 inch , Type X Type C as required by fire-resistance-rated assembly indicated on Drawings.

2.6 TRIM ACCESSORIES

Interior Trim: ASTM C 1047.

Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet.

1. Shapes:

Cornerbead.

a. Bullnose bead.
b. LC-Bead: J-shaped; exposed long flange receives joint compound.
c. L-Bead: L-shaped; exposed long flange receives joint compound.
d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
e. Expansion (control) joint.
f. Curved-Edge Cornerbead: With notched or flexible flanges.

Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

Fry Reglet Corporation.
g. Gordon, Inc.
h. Pittcon Industries.

Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B 221 , Alloy 6063-T5.
2. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

2.7 JOINT TREATMENT MATERIALS

General: Comply with ASTM C 475/C 475M.

A. Joint Tape:

Interior Gypsum Board: Paper.
1. Glass-Mat Gypsum Sheathing Board: 10-by-10 glass mesh.
2. Tile Backing Panels: As recommended by panel manufacturer.

Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
3. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.

Use setting-type compound for installing paper-faced metal trim accessories.

Fill Coat: For second coat, use setting-type, sandable topping compound.
4. Finish Coat: For third coat, use setting-type, sandable topping compound.
5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound.

Joint Compound for Exterior Applications:

Glass-Mat Gypsum Sheathing Board: As recommended by sheathing board manufacturer.

Joint Compound for Tile Backing Panels:

Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.
6. Cementitious Backer Units: As recommended by backer unit manufacturer.
7. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.8 AUXILIARY MATERIALS

General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

A. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.

Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

1. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

Accumetric LLC.

a. Grabber Construction Products.
b. Hilti, Inc.
c. Pecora Corporation.
d. Specified Technologies, Inc.
e. United States Gypsum Company.

Sealant shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."

B. Vapor Retarder: As specified in Division 07 Section "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

A. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

Comply with ASTM C 840.

A. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

B. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

C. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

D. Form control and expansion joints with space between edges of adjoining gypsum panels.

E. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.

1. Fit gypsum panels around ducts, pipes, and conduits.
2. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.

Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch- wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

F. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

G. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

H. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

Install interior gypsum board in the following locations:

Wallboard Type: As indicated on Drawings Vertical surfaces unless otherwise indicated.

1. Type X: Vertical surfaces unless otherwise indicated.
2. Flexible Type: As indicated on Drawings Apply in double layer at curved assemblies.
3. Ceiling Type: Ceiling surfaces.
4. Abuse-Resistant Type: As indicated on Drawings.
5. Mold-Resistant Type: As indicated on Drawings.

Single-Layer Application:

On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.

6. On partitions/walls, apply gypsum panels vertically (parallel to framing) horizontally (perpendicular to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.

   Stagger abutting end joints not less than one framing member in alternate courses of panels.

   a. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.

On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.

7. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

Multilayer Application:

On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.

8. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
9. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
10. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

B. Curved Surfaces:

Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- long straight sections at ends of curves and tangent to them.

1. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 APPLYING EXTERIOR GYPSUM PANELS FOR CEILINGS AND SOFFITS

Apply panels perpendicular to supports, with end joints staggered and located over supports.

Install with 1/4-inch open space where panels abut other construction or structural penetrations.

1. Fasten with corrosion-resistant screws.

3.5 APPLYING TILE BACKING PANELS

Glass-Mat, Water-Resistant Backing Panels: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with 1/4-inch gap where panels abut other construction or penetrations.

A. Water-Resistant Backing Board: Install where indicated with 1/4-inch gap where panels abut other construction or penetrations.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.6 INSTALLING TRIM ACCESSORIES

General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

A. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

Provide one piece control joints with ¼" wide by 7/16" deep vee-shaped slot, covered with removable tape, of roll formed zinc or extruded vinyl as recommended by gypsum board manufacturer.

B. Interior Trim: Install in the following locations:

Cornerbead: Use at outside corners unless otherwise indicated.

1. Bullnose Bead: Use where indicated.
2. LC-Bead: Use at exposed panel edges.
3. L-Bead: Use where indicated.
4. U-Bead: Use where indicated.
5. Curved-Edge Cornerbead: Use at curved openings.

Aluminum Trim: Install in locations indicated on Drawings.

3.7 FINISHING GYPSUM BOARD

General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

A. Prefill open joints, rounded or beveled edges, and damaged surface areas.

B. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

C. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

Level 1: Ceiling plenum areas, concealed areas, and where indicated.

1. Level 2: Panels that are substrate for wall tile and acoustical tile and where indicated
2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

Level 5: At all locations to receive vinyl wall coverings where indicated on the finish plan.

Glass-Mat Gypsum Sheathing Board: Finish according to manufacturer's written instructions for use as exposed soffit board.

D. Glass-Mat Faced Panels: Finish according to manufacturer's written instructions.

E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.8 PROTECTION

Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

1. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093000 - TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Wall tile.
2. Glazed floor tile and cove base (porcelain).
3. Waterproof membrane for thinset applications.
4. Crack isolation membrane.
5. Metal edge strips.

B. Related Sections include the following:

1. Division 9 Section "Gypsum Board Assemblies" for tile backer board.

1.3 DEFINITIONS

A. Module Size: Actual tile size (minor facial dimension as measured per ASTM C 499) plus joint width indicated.

B. Facial Dimension: Actual tile size (minor facial dimension as measured per ASTM C 499).

1.4 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction: For tile installed on walkway surfaces, provide products with the following values as determined by testing identical products per ASTM C 1028:

1. Level Surfaces: Minimum 0.6.

1.5 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.

C. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.

D. Samples for Verification:

1. Full-size units of each type and composition of tile and for each color and finish required.
2. Full-size units of each type of trim and accessory for each color and finish required.

E. Quality Assurance Submittals:

1. Product Certificates: For each type of product, signed by product manufacturer.
2. Qualification Data: For Installer.
3. Material Test Reports: For each tile-setting and -grouting product.

1.6 QUALITY ASSURANCE

A. Source Limitations for Tile: Obtain each color, grade, type, composition, and variety of tile from one source or producer.

1. Obtain tile from same production run and of consistent quality in appearance and physical properties for each contiguous area.

B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from a single manufacturer and each aggregate from one source or producer.

C. Product Options: Products and manufacturers named in Part 2 establish requirements for product quality in terms of appearance, construction, and performance. Other manufacturer's products comparable in quality to named products and complying with requirements may be considered. Refer to Division 1 Section "Product Requirements."

1. Do not modify intended aesthetic effects, as judged solely by the Architect, except with Architect's approval and only to the extent needed to comply with performance requirements as judged by the Architect. Where modifications are proposed, submit comprehensive explanatory data, explanation of other areas affected and drawings illustrating differences for Architect to review. Products proposed without this process will be rejected.

D. Installer Qualifications:

1. Installer is a five-star member of the National Tile Contractors Association or a Trowel of Excellence member of the Tile Contractors' Association of America.
2. Installer's supervisor for Project holds the International Masonry Institute's Foreman Certification.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirement in ANSI A137.1 for labeling sealed tile packages.

B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1.9 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed, for each type, composition, color, pattern, and size indicated.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

1. Provide tile complying with Standard grade requirements, unless otherwise indicated.
2. For facial dimensions of tile, comply with requirements relating to tile sizes specified in Part 1 "Definitions" Article.

B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI standards referenced in "Setting and Grouting Materials" Article.

C. Colors, Textures, and Patterns: Where manufacturer's standard products are indicated for tile, grout, and other products requiring selection of colors, surface textures, patterns, and other appearance characteristics, provide specific products or materials complying with the following requirements:

1. Match colors, textures, and patterns indicated by referencing manufacturer’s standard designations for these characteristics. Selected by Architect from manufacturer’s full range.
2. Provide tile trim that match color and finish of adjoining tile.

D. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.2 TILE PRODUCTS

A. Products: Subject to compliance with requirements of this specification, provide the wall tile and floor tile products as indicated in the Finish Legend and on the individual Finish Plans.

1. Wall tiles and floor tiles manufactured by other manufacturers may be considered, provided deviations in project performance, details, dimensions, textures, style, patterns and colors are

minor and do not change the design concept as judged by the Architect. The burden of proof is on the proposer.

2.3 SETTING AND GROUTING MATERIALS

A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4, composed of a mixture of prepackaged dry mortar mix and liquid latex additive complying with the following:

1. Factory blended mix of Portland cement, graded aggregates and manufacturer's selected raw materials; 211 Crete Filler Powder, Laticrete International, Inc.

   a. Products: Subject to compliance with requirements, provide comparable products of one of the following:

      1) Uniflex 916 System, C-Cure Corporation.
      2) Kerabond, Mapei Corporation.
      3) Full Set Plus, TEC Incorporated.

2. Latex additive (water emulsion) described above, serving as replacement for all or part of gauging water, combined at job site with prepackaged dry mortar mix supplied or specified by latex additive manufacturer; 333 Acrylic Latex, Laticrete International, Inc.

   a. Latex Type: Acrylic resin.
   b. Products: Subject to compliance with requirements, provide comparable products of one of the following:

      1) Uniflex 916 System, C-Cure Corporation.
      2) Keralasic, Mapei Corporation.
      3) Acrylbond acrylic latex, TEC Incorporated.

   c. For wall applications, provide non-sagging, latex-portland cement mortar complying with ANSI A118.4 for mortar of this type defined in Section F-2.1.2.

B. Pre-packaged dry mortar and powderized latex mix to which site water is added complying with the following:

1. Factory blended mix of portland cement, graded aggregates, select raw materials, and a powderized latex; 254 Platinum Mulitpurpose Thin Set, Laticrete International, Inc.

   a. Products: Subject to compliance with requirements, provide comparable products of one of the following:

      1) Ultraflec, Mapei Corporation.
      2) Superflex, TEC Incorporated.

2.4 GROUTING MATERIALS

A. Cross-Linked Technology Epoxy Grout: ANSI A118.3 for applications requiring superior stain, chemical or heat resistance, as well as high durability, complying with the following:

1. 100% solids epoxy system supplied in two or more parts, and partially emulsified by water, after cleaning, in order to expedite cleaning from the surfaces before the grout hardens; SpectraLOCK PRO, Laticrete International, Inc, or comparable product by other named manufacturers. Architect to select grout color designations from manufacturer's full range.

2.5 MISCELLANEOUS MATERIALS

A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer and characteristics indicated that comply with applicable requirements in Division 7 Section "Joint Sealants."

B. Waterproofing/ Crack Isolation Membrane: A thin, load-bearing liquid rubber polymer that forms a flexible, seamless waterproof membrane exceeding ANSI A118.10 and ANSI A118.12; HyrdoBan, Laticrete International, Inc. or comparable product by other named manufacturers.

C. Elastomeric Sealant: A 100% silicone sealant to finish all expansion/movement joints and transitions in tiled surfaces. Per TCNA EJ-171; Latasil and Stone Sealant, Laticrete International, Inc.

D. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming the tile and grout surfaces, specially approved for materials and installations indicated by tile and grout manufacturers.

1. Provide "Aqua Mix Tile and Grout Cleaner," supplied by Marble Restoration Services, 816.358.6426, subject to approval by tile and grout manufacturers.

E. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications: stainless-steel, ASTM A 666, 300 Series exposed-edge material.

1. Schluter or approved equal.

2.6 MIXING MORTARS AND GROUT

A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

B. Add materials, water, and additives in accurate proportions.

C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm; dry; clean; free of oil, waxy films, and curing compounds; and within flatness tolerances required by referenced ANSI A108 Series of tile installation standards for installations indicated.
2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed before installing tile.
3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Remove coatings, including curing compounds and other substances that contain soap, wax, oil, or silicone, that are incompatible with tile-setting materials.

B. Provide concrete substrates for tile floors installed with latex-portland cement mortars that comply with flatness tolerances specified in referenced ANSI A108 series of tile installation standards for installations indicated.

1. Use trowelable leveling and patching compounds per tile-setting material manufacturer’s written instructions to fill cracks, holes, and depressions.
2. Remove protrusions, bumps, and ridges by sanding or grinding.

C. Blending: For tile exhibiting color variations within ranges selected during Sample submittals, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION, GENERAL

A. ANSI Tile Installation Standards: Comply with parts of ANSI A108 Series "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. TCA Installation Guidelines: TCA's "Handbook for Ceramic Tile Installation." Comply with TCA installation methods indicated in ceramic tile installation schedules.

C. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions, unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

E. Jointing Pattern: Lay tile in grid pattern, unless otherwise indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths, unless otherwise indicated.

1. For tile mounted in sheets, make joints between tile sheets the same width as joints within tile sheets so joints between sheets are not apparent in finished work.

F. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Locate joints in tile surfaces directly above joints in concrete substrates.

G. Grout tile to comply with requirements of the following tile installation standards:

1. For ceramic tile grouts (latex-portland cement grouts), comply with ANSI A108.10.

3.4 FLOOR TILE INSTALLATION

A. General: Install types of tile designated for floor installations to comply with requirements in the Floor Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.

1. For tile floor installations in wet areas, follow procedures in ANSI A108 series of tile installation standards for providing 95 percent mortar coverage.

B. Joint Widths: Install tile on floors with the following joint widths:

1. Floor Tile: 1/16 inch.

3.5 WALL TILE INSTALLATION

A. Install types of tile designated for wall installations to comply with requirements in the Wall Tile Installation Schedule, including those referencing TCA installation methods and ANSI setting-bed standards.

B. Joint Widths: Install tile on walls with the following joint widths:

1. Wall Tile: 1/16 inch.

3.6 CLEANING AND PROTECTING

A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

1. Remove latex-portland cement grout residue from tile as soon as possible.

B. When recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear.

C. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

END OF SECTION 093000

SECTION 095100 - ACOUSTICAL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes acoustical panels for ceilings and the following scope of Work:

1. Acoustical Ceiling Panels.
2. Exposed grid suspension system.
3. Wire hangers, fasteners, main runners, cross tees and wall angle moldings.
4. Perimeter Trim.
5. Acoustic Felt Ceiling Panel System.

B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:

1. Acoustical Panels: Set of 6-inch-square Samples of each type, color, pattern, and texture.
2. Linear Acoustic Panel: Set of Samples of each type, color, pattern and texture.
3. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- long Samples of each type, finish, and color.

C. Delegated-Design Submittal: For seismic restraints for ceiling systems.

1. Include design calculations for seismic restraints including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension-system members.
2. Structural members to which suspension systems will be attached.
3. Method of attaching hangers to building structure.

    a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.

4. Carrying channels or other supplemental support for hanger-wire attachment where conditions do not permit installation of hanger wires at required spacing.
5. Size and location of initial access modules for acoustical panels.
6. Items penetrating finished ceiling and ceiling-mounted items including the following:

    a. Lighting fixtures.
    b. Diffusers.
    c. Grilles.
    d. Speakers.
    e. Sprinklers.
    f. Access panels.
    g. Perimeter moldings.

7. Show operation of hinged and sliding components covered by or adjacent to acoustical panels.
8. Minimum Drawing Scale: 1/8 inch = 1 foot.

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.

D. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.

E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
2. Linear Acoustic Panel: Full-size panels equal to 2 percent of quantity installed.

3. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.
4. Hold-Down Clips: Equal to 2 percent of quantity installed.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.9 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace panels that fail within the warranty period. Failures include, but are not limited to the following:
1. Acoustical Panels: Sagging and warping
2. Grid System: Rusting and manufacturer's defects.

B. Warranty Period:
1. Acoustical panels: Ten (10) years from date of substantial completion.
2. Grid: Ten (10) years from date of substantial completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design seismic restraints for ceiling systems.

B. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

C. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A according to ASTM E 1264.
2. Smoke-Developed Index: 50 or less.

D. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL or from the listings of another qualified testing agency.

2.3 ACOUSTICAL PANELS

A. Products: Subject to compliance with requirements of this specification, provide acoustic panel products as indicated in the Reflected Ceiling Plans.

1. Acoustical Panels manufactured by other manufacturers may be considered, provided deviations in project performance, details, dimensions, textures, style, patterns and colors are minor and do not change the design concept as judged by the Architect. The burden of proof is on the proposer

B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E 1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Flame Spread: ASTM E 1264; Fire Resistive

D. Retain one of six "Type and Form" subparagraphs below. Classifications are examples of commonly specified products and are not all-inclusive. First three examples are mineral-based panels.

2.4 ACOUSTIC FELT CEILING SYSTEM

A. Products: Subject to compliance with requirements of this specification, provide custom acoustical felt with custom printed graphics, mounted to an acoustical panel that is magnetically clipped to a steel grid suspension system where indicated.

1. Basis of Design Manufacturer: TURF Designs Inc., 2000 Fox Lane, Elgin, IL 60123. www.turf.designs.com
2. Location: Storytime Room.
3. Size: Panel sizes as indicated on the RCP.
4. Suspension System: Standard steel 15/16 ceiling grid system. Provide additional support as required my panel manufacturer.
5. Graphics: From digital file provided by the Architect.
6. Trim: At perimeter of ceiling grid cloud, provide axiom trim.

2.5 METAL SUSPENSION SYSTEM

A. Products: Subject to compliance with requirements of this specification, provide the wall tile and floor tile products as indicated in the Reflected Ceiling Plans.

1. Metal Suspension System manufactured by other manufacturers may be considered, provided deviations in project performance, details, dimensions, textures, style, patterns and colors are minor and do not change the design concept as judged by the Architect. The burden of proof is on the proposer

B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C 635/C 635M and designated by type, structural classification, and finish indicated.

2.6 ACCESSORIES

A. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

1. Anchors in Concrete: Anchors of type and material indicated below, with holes or loops for attaching hangers of type indicated and with capability to sustain, without failure, a load equal to five times that imposed by ceiling construction, as determined by testing according to ASTM E 488/E 488M or ASTM E 1512 as applicable, conducted by a qualified testing and inspecting agency.

a. Type: Cast-in-place anchors.
b. Corrosion Protection: Carbon-steel components zinc plated according to ASTM B 633, Class SC 1 (mild) service condition.

B. Wire Hangers, Braces, and Ties: Provide wires as follows:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- diameter wire.

C. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

D. Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.

E. Angle Hangers: Angles with legs not less than 7/8 inch wide; formed with 0.04-inch-thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 coating designation; with bolted connections and 5/16-inch-diameter bolts.

F. Hold-Down Clips: Manufacturer's standard hold-down.

2.7 METAL EDGE MOLDINGS AND TRIM

A. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc; 15/16” Square Edge Transition Molding or a comparable product by one of the following:

1. Fry Reglet Corporation
2. Gordon, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.

B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.

B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

A. Install acoustical panel ceilings according to ASTM C 636/C 636M and manufacturer's written instructions.

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
3. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
4. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
5. Do not attach hangers to steel deck tabs.
6. Do not attach hangers to steel roof deck. Attach hangers to structural members.
7. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
8. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

C. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.

1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches from ends. Miter corners accurately and connect securely.
3. Do not use exposed fasteners, including pop rivets, on moldings and trim.

D. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

E. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.

1. Arrange directionally patterned acoustical panels as follows:

   a. As indicated on reflected ceiling plans.
   b. Install panels with pattern running in one direction parallel to [**long**] [**short**] axis of space.
   c. Install panels in a basket-weave pattern.
2. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
3. Install hold-down clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.

   a. Hold-Down Clips: Space 24 inches o.c. on all cross runners.
4. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.

B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12 feet, non-cumulative.

3.5 FIELD QUALITY CONTROL

A. Perform the following tests and inspections of completed installations of acoustical panel ceiling hangers and anchors and fasteners in successive stages and when installation of ceiling suspension systems on each floor has reached 20 percent completion, but no panels have been installed. Do not proceed with installations of acoustical panel ceiling hangers for the next area until test results for previously completed installations of acoustical panel ceiling hangers show compliance with requirements.

1. Within each test area, testing agency will select one of every 10 power-actuated fasteners and postinstalled anchors used to attach hangers to concrete and will test them for 200 lbf of tension; it will also select one of every two postinstalled anchors used to attach bracing wires to concrete and will test them for 440 lbf of tension.
2. When testing discovers fasteners and anchors that do not comply with requirements, testing agency will test those anchors not previously tested until 20 pass consecutively and then will resume initial testing frequency.

B. Acoustical panel ceiling hangers, anchors, and fasteners will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

3.6 CLEANING

A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095100

SECTION 096400 - WOOD FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Factory-finished wood flooring at planter walls.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For each type of floor assembly and accessory. Include plans, sections, and attachment details. Include expansion provisions and trim details.

C. Samples: For each exposed product and for each with finish color and texture specified.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Hardwood Flooring: Comply with NWFA A500 for species, grade, and cut.

1. Certification: Provide flooring that carries NWFA grade stamp on each bundle or piece.

2.2 FIELD-FINISH OF WOOD FLOORING

A. Urethane Finish System: Complete water-based system of compatible components that is recommended by finish manufacturer for application indicated.

1. Stain: Penetrating and nonfading type.

a. Color: As selected by architect from manufactures full range.

2. Floor Sealer: Pliable, penetrating type.
3. Finish Coats: Formulated for multicoat application on wood flooring.

B. Wood Filler: Compatible with finish system components and recommended by filler and finish manufacturers for use indicated. If required to match approved Samples, provide pigmented filler.

2.3 FACTORY-FINISHED WOOD FLOORING

A. Solid-Wood Flooring: Kiln dried to 6 to 9 percent maximum moisture content; tongue and groove and end matched; with backs channeled.

1. Basis of Design or approved equal: Elmwood Reclaimed wood Lumber, 22701 S Peculiar Dr, Peculiar, MO 64078, 800.705.0705, www.elmwoodreclaimedtimber.com
2. Species: “Hickory”.
3. Type: T&G
4. Thickness: 3/4 inch (19 mm).
5. Face Width: 4” to 6”.
6. Lengths: Random-length strips complying with applicable grading rules.
7. Edge Style: Square.
8. Leading edge: Custom as indicated in drawings and shop finished
9. Finish: UV urethane.

a. Color: As selected by Architect from manufacturer's full range.

2.4 ACCESSORY MATERIALS

A. Wood sheathing: As specified in Section 061000 "Rough Carpentry" and Section 061600 "Sheathing."

B. Wood Flooring Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated.

C. Fasteners: As recommended by manufacturer, but not less than that recommended in NWFA's "Installation Guidelines."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in NWFA's "Installation Guidelines."

B. Wood Subfloor: Install according to requirements in Section 061000 "Rough Carpentry" and Section 061600 "Sheathing”.

C. Wood Underlayment: Install according to requirements in Section 061600 "Sheathing."

D. Solid-Wood Flooring: Blind nail or staple flooring to substrate.

1. Plank Flooring: For flooring of face width more than 3 inches (76 mm):

a. Hardwood: Install countersunk screws at each end of each piece in addition to blind nailing. Cover screw heads with wood plugs glued flush with flooring.

3.2 FIELD FINISHING

A. Machine-sand flooring to remove offsets, ridges, cups, and sanding-machine marks that are noticeable after finishing. Vacuum and tack with a clean cloth immediately before applying finish.

1. Comply with applicable recommendations in NWFA's "Installation Guidelines."

B. Fill and repair wood flooring defects.

C. Apply floor-finish materials in number of coats recommended by finish manufacturer for application indicated, but not less than one coat of floor sealer and three finish coats.

1. Apply stains to achieve an even color distribution matching approved Samples.
2. For water-based finishes, use finishing methods recommended by finish manufacturer to minimize grain raise.

D. Cover and protect wood flooring before finishing.

E. Do not cover wood flooring after finishing until finish reaches full cure, and not before seven days after applying last finish coat.

3.3 PROTECTION

A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.

1. Do not move heavy and sharp objects directly over kraft-paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION 096400

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Resilient base.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Samples: For each exposed product and for each color and texture specified, not less than 12 inches long.

C. Samples for Initial Selection: For each type of product indicated.

D. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.

E. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 FIELD CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.

C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 RUBBER BASE

A. Products: Subject to compliance with requirements, provide resilient base products as indicated in the Finish Legend provided on the individual Finish Plans.

1. Resilient Base manufactured by other manufacturers may be considered, provided deviations in project performance, recycled content, details, dimensions, textures, style, patterns and colors are minor and do not change the design concept as judged by the Architect. The burden of proof is on the proposer.

2.2 RUBBER MOLDING ACCESSORY

A. Provide products from same manufacturer as rubber base.

B. Description: Rubber transition strips.

C. Profiles and Dimensions: As selected from manufacturer’s standard shapes and sizes.

D. Locations: Provide rubber molding in areas indicated.

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

C. Do not install resilient products until they are the same temperature as the space where they are to be installed.

1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.

D. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

H. Job-Formed Corners:

1. Outside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

    a. Form without producing discoloration (whitening) at bends.

2. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

    a. Miter corners to minimize open joints.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.

B. Perform the following operations immediately after completing resilient-product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum horizontal surfaces thoroughly.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION 096513

SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes modular carpet tile.

B. Related Requirements:

1. Section 096513 "Resilient Base and Accessories" Section 096519 "Resilient Tile Flooring" for resilient wall base and accessories installed with carpet tile.
2. Section 096816 "Sheet Carpeting" for carpet roll goods.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:

a. Review delivery, storage, and handling procedures.
b. Review ambient conditions and ventilation procedures.
c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation recommendations for each type of substrate.

B. Shop Drawings: For carpet tile installation, plans showing the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.

7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.

D. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.

E. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI's "CRI Carpet Installation Standard."

1.10 FIELD CONDITIONS

A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, the following:

    a. More than 10 percent edge raveling, snags, and runs.
    b. Dimensional instability.
    c. Excess static discharge.
    d. Loss of tuft-bind strength.
    e. Loss of face fiber.
    f. Delamination.

3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Products: Subject to compliance with requirements of this specification, provide the carpet products as indicated in the Finish Legend provided on the individual Finish Plans and as listed below:

1. Interface Flooring Price Agreement: 63S111MO

2. Basis of Design: Interface, Inc., Contact Kate Frevert, 816-305-1399

a. CT1 (Carpet Tile 1) Interface, World Woven Weft WW870, Charcoal 105345, Cusionbac Renew Adhesive with Cushion.
b. CT2 (Carpet Tile 2) Interface, World Woven Loom WW880, Charcoal 105361, Cusionbac Renew Adhesive with Cushion.
c. CT3 (Carpet Tile 3) Interface, World Woven Dobby WW890, Charcoal 105385, Cusionbac Renew Adhesive with Cushion.
d. CT4 (Carpet Tile 4) Interface, Step Repeat, Iron 104944. ,Cusionbac Renew Adhesive with Cushion.

3. Walk Off Carpet
a. CT5 (Carpet Tile 5) MatsInc, Enterprise Tile, Anthracite

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives:

1. Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

2. Provide adhesive as indicated in the Finish Legend provided on the individual Finish Plans.

C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.

B. Examine carpet tile for type, color, pattern, and potential defects.

C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.

1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas, or as required by manufacturer.

    a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours or as required by manufacturer.
    b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
    c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing, or as required by manufacturer.

D. Wood Subfloors: Verify the following:

1. Underlayment over subfloor complies with requirements specified in Section 061600 "Sheathing."
2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

3.2 PREPARATION

A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.

C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.

D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye-lot integrity. Do not mix dye lots in same area.

D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.

E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.

H. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 097713 - WALL COVERINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Wall covering.
2. Tac Wall
3. Fiberglass reinforced Panels

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include data on physical characteristics, durability, fade resistance, and fire-test-response characteristics.

B. Shop Drawings: Show location and extent of each wall-covering type. Indicate pattern placement, seams and termination points.

C. Samples for Verification: For each type of wall covering and for each color, pattern, texture, and finish specified, full width by 36-inch- long in size.

1. Wall-Covering Sample: From same production run to be used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of fabric.

D. Product Schedule: For wall coverings. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing agency.

B. Product Test Reports: For each wall covering, for tests performed by a qualified testing agency.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For wall coverings to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Wall-Covering Materials: For each type, color, texture, and finish, full width by length to equal to 5 percent of amount installed.

1.8 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for installation.

1. Build mockups for each type of wall covering on each substrate required. Comply with requirements in ASTM F 1141 for appearance shading characteristics.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install wall coverings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at levels intended for occupants after Project completion during the remainder of the construction period.

1. Custom Print Wall Coverings: Condition spaces for not less than 48 hours before installation.

B. Lighting: Do not install wall covering until lighting that matches conditions intended for occupants after Project completion is provided on the surfaces to receive wall covering.

C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

    a. Flame-Spread Index: 75 or less.
    b. Smoke-Developed Index: 450 or less.

2. Fire-Growth Contribution: No flashover and heat and smoke release according to NFPA 265.

2.2 WALL COVERING

A. Products: Subject to compliance with requirements of this specification, provide the wall covering products as indicated in the Finish Legend provided on the individual Finish Plans.

1. Wall covering manufactured by other manufacturers may be considered, provided deviations in project performance, recycled content, details, dimensions, textures, style, patterns and colors are minor and do not change the design concept as judged by the Architect. The burden of proof is on the proposer.

2.3 TAC WALL

A. Products: Subject to compliance with requirements of this specification, provide the tac wall products as indicated in the Finish Legend provided on the individual Finish Plans.

1. Tac Wall manufactured by other manufacturers may be considered, provided deviations in project performance, recycled content, details, dimensions, textures, style, patterns and colors are minor and do not change the design concept as judged by the Architect. The burden of proof is on the proposer

2.4 FIBERGLASS REINFORCED PANELS (FRP)

A. Products: Subject to compliance with requirements of this specification, provide FRP wall products as indicated in the Finish Legend provided on the individual Finish Plans.

2.5 ACCESSORIES

A. Adhesive for Wall Covering: Mildew-resistant, nonstaining adhesive, for use with specific wall covering and substrate application indicated and as recommended in writing by wall-covering manufacturer.

B. Adhesive for Tac Wall: Parabond 5082 Fusion Series or as recommended by the manufacturer.

C. Primer/Sealer: Mildew resistant, complying with requirements in Section 099123 "Interior Painting" and recommended in writing by primer/sealer and wall-covering manufacturers for intended substrate.

D. Seam Tape: As recommended in writing by wall-covering manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for levelness, wall plumbness, maximum moisture content, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Comply with manufacturer's written instructions for surface preparation.

B. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.

C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.

1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
2. Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity. Prime with primer recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
3. Metals: If not factory primed, clean and apply primer recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
4. Gypsum Board: Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
5. Painted Surfaces: Treat areas susceptible to pigment bleeding.

D. Check painted surfaces for pigment bleeding. Sand gloss, semigloss, and eggshell finish with fine sandpaper.

E. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

F. Acclimatize wall-covering and tac wall materials by removing them from packaging in the installation areas not less than 24 hours before installation.

3.3 WALL-COVERING INSTALLATION

A. Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated.

B. Cut wall-covering strips in roll number sequence. Change the roll numbers at partition breaks and corners.

C. Install strips in same order as cut from roll.

D. Install wall covering without lifted or curling edges and without visible shrinkage.

E. Install seams vertical and plumb at least 6 inches from outside corners and 3 inches from inside corners unless a change of pattern or color exists at corner. Horizontal seams are not permitted.

F. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without overlaps or gaps between strips.

G. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

3.4 TAC WALL INSTALLATION

A. Comply with tac wall manufacturers' written installation instructions applicable to products and applications indicated.

B. Cut, lay out and allow material to acclimate all seams prior to installation.

C. Vertical Installation to start from top to bottom.

1. Install into tacky wet adhesive along predetermined starting line, ensuring material is properly aligned along all edges.

2. Immediately after installation roll material with a wall roller, crossing in a diagonal direction after initial roll.

3. Prevent movement after installation by taping seams using a multi-purpose masking tape.

3.5 CLEANING

A. Remove excess adhesive at seams, perimeter edges, and adjacent surfaces.

B. Use cleaning methods recommended in writing by wall-covering and tac wall manufacturer.

C. Replace strips that cannot be cleaned.

D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION 097713

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on exterior substrates.

1. Fiber-cement board.
2. Steel and iron.
3. Portland cement plaster (stucco).

B. Surface preparation, priming, and finish coats specified in this section are in addition to shop priming and surface treatment specified under other sections.

C. Paint all exposed surfaces whether or not colors are designated in "schedules," except where a surface or material is specifically indicated not to be painted or is to remain natural. Where an item or surface is not specifically mentioned, paint the same as similar adjacent materials or surfaces. If color or finish is not designated, the Architect will select from standard colors or finishes available.

D. Work included in this section to be painted:

1. Painting exposed surfaces as indicated.
2. Paint all exposed materials not prefinished by factory.
3. Paint exposed piping, conduit, equipment and supports, except if prefinished with factory painted finish, and as may be noted otherwise.
4. Paint all exterior exposed steel lintels whether indicated on drawings or not.

E. Painting is not required on pre-finished items, finished metal surfaces, concealed surfaces, operating parts, and labels.

1. Finished metal surfaces not to be painted include:

a. Anodized aluminum.
b. Stainless steel.
c. Chromium plate.
d. Copper.
e. Bronze.
f. Brass.

2. Operating parts not to be painted include moving parts of operating equipment
3. Labels: Do not paint over Underwriter's Laboratories, Factory Mutual or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

F. Related Requirements:

1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates.

1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

1. Benjamin Moore & Co.
2. Coronado Paint; Benjamin Moore Company.
3. Dulux (formerly ICI Paints); a brand of AkzoNobel.
4. Glidden Professional.
5. PPG Architectural Finishes, Inc.
6. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

A. Colors: Match Architect's samples.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Masonry (Clay and CMUs): 12 percent.
3. Portland Cement Plaster: 12 percent.

C. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 11.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Paint entire exposed surface of window frames and sashes.
5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Steel and Iron Substrates:

1. Alkyd System :

a. Prime Coat: Shop primer specified in Section where substrate is specified.

b. Intermediate Coat: Exterior, alkyd enamel, matching topcoat.

c. Topcoat: Alkyd, exterior, semi-gloss (MPI Gloss Level 5), MPI #94.

2. Quick-Dry Enamel System[**MPI EXT 5.1A**]:

a. Prime Coat: Primer, alkyd, quick dry, for metal[**, MPI #76**].

b. Intermediate Coat: Alkyd, quick dry, matching topcoat.
c. Topcoat: Alkyd, quick dry, semi-gloss (MPI Gloss Level 5)[**, MPI #81**].

d. Topcoat: Alkyd, quick dry, gloss (MPI Gloss Level 7)[**, MPI #96**].

B. Portland Cement Plaster Substrates:

1. Latex System [MPI EXT 9.1A] [MPI EXT 9.1J]:

a. Prime Coat: Latex, exterior, matching topcoat.
b. Prime Coat: Primer, alkali resistant, water based, MPI #3.
c. Intermediate Coat: Latex, exterior, matching topcoat.
d. Topcoat: Latex, exterior, flat (MPI Gloss Level 1), MPI #10.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Steel and Iron
2. Wood and MDF/MDO
3. Gypsum board

B. Related Requirements:

1. Section 051200 "Structural Steel Framing" for shop priming structural steel.
2. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
3. Section 055110 "Metal Stairs" for shop priming metal stairs.

1.2 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Samples for Initial Selection: For each type of topcoat product.

C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run**,** that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system.

a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.

a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Benjamin Moore & Co.
2. Dulux (formerly ICI Paints); a brand of AkzoNobel.
3. Dunn Edwards Paints
4. Sherwin-Williams Company (The).

B. Products: Subject to compliance with requirements, provide one of the products listed in the Interior Finish Schedule and Plans.

2.2 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. VOC Content: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:

1. Flat Paints and Coatings: 50 g/L
2. Nonflat Paints and Coatings: 150 g/L
3. Dry-Fog Coatings: 400 g/L
4. Primers, Sealers and Undercoaters: 200 g/L
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L
7. Pretreatment Wash Primers: 420 g/L

C. Material Compatibility:

1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

D. Colors: Match Architect's samples or as indicated in the Interior Finish Schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.
2. Wood: 15 percent.
3. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

E. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer, but not less than the following:

1. SSPC-SP 11.

F. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

G. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

1. Paint the following work where exposed in occupied spaces:

a. Equipment, including panelboards.
b. Uninsulated metal piping.
c. Uninsulated plastic piping.
d. Pipe hangers and supports.
e. Metal conduit.
f. Plastic conduit.
g. Ducts
h. Other items as directed by Architect.

2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:
1. Latex Acrylic System:
    a. Prime Coat:
        1) Sherwin Williams; Quali-Kote Interior Latex Primer.
    b. Intermediate Coat:
        1) Sherwin Williams; Pro Industrial Zero VOC Acrylic, Semigloss.
    c. Topcoat:
        1) Sherwin Williams; Pro Industrial Zero VOC Acrylic, Semigloss.

B. Steel Substrates:
1. Latex System, Alkyd Primer:
    a. Prime Coat:
        1) Sherwin Williams; Kem Kromik Metal Primer.
    b. Intermediate Coat:
        1) Sherwin Williams; Pro Industrial Zero VOC Acrylic, Semigloss.
    c. Topcoat:
        1) Sherwin Williams; Pro Industrial Zero VOC Acrylic, Semigloss.

C. CMU Substrates
1. Block Filler: Block Filler, latex, interior/exterior.
    a. Sherwin Williams, Loxon Block Surfacer.
2. Intermediate Coat: Latex, interior, matching topcoat.

3. Topcoat: Sherwin Williams, Harmony Interior Latex Flat B5 Series. Applied at a dry film thickness of not less than 1.7 mils.

D. Wood Substrates: Architectural woodwork and doors
   1. Water-Based Semitransparent Stain System:
      a. Prime Coat: Stain, exterior, water based, semitransparent, matching topcoat.
      b. Intermediate Coat: Stain, exterior, water based, semitransparent, matching topcoat.
      c. Topcoat: Stain, exterior, water based, semitransparent, MPI #156.

E. Gypsum Board Substrates:
   1. Institutional Low-Odor/VOC Latex System:
      a. Prime Coat:
         1) Sherwin Williams; Harmony Interior Latex Primer.
      b. Intermediate Coat:
         1) Epoxy paint only as indicated on the drawings: Sherwin Williams; Water Based Catalyzed Epoxy.
         2) All other locations: Sherwin Williams; Harmony Interior Latex, Eggshell.
      c. Topcoat:
         1) Epoxy Paint only as indicated on the drawings: Sherwin Williams; Water Based Catalyzed Epoxy.
         2) All other locations: Sherwin Williams; Harmony Interior Latex, Eggshell.

F. Dry Erase Coating:
   1. Primer: Idea Paint high performance water based primer.
   2. Topcoat: Idea Paint Pro high performance dry erase paint.

END OF SECTION 099123

SECTION 101419 - SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast dimensional characters.
2. Graphic Logo Signage
3. Code required Interior Signage

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.

C. Samples: For each exposed product and for each color and texture specified.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.4 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of graphic image colors and sign.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design sign structure and anchorage of rooftop dimensional character sign type(s) <**Insert drawing designation of sign(s)**> according to structural performance requirements.

B. Structural Performance: Signs and supporting elements shall withstand the effects of gravity and other loads within limits and under conditions indicated.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 DIMENSIONAL CHARACTERS

A. Cast Characters <Insert drawing designation>: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architec:

    a. A.R.K. Ramos.
    b. Gemini Incorporated.
    c. Metal Arts.
    d. Metallic Arts.

2. Character Material: Cast aluminum.
3. Character Height: As indicated on Drawings.
4. Finishes:

    a. Integral Aluminum Finish: Clear anodized.

5. Mounting: Cast metal bottom angle bracket mount (see Drawings).

2.3 INTERIOR SIGNAGE

A. Basis-of-Design Product: Subject to compliance with requirements, provide Inpro Corporation, Custom ADA Signage, or a comparable product as approved by Architect.

B. Interior ADA Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, complying with the following requirements:

1. Laminated, Etched Photopolymer: Raised graphics with Grade 2 Braille 1/32 inch above surface with contrasting colors in finishes and color combinations as selected by Architect from manufacturer's full range and laminated to acrylic back.
2. Edge Condition: Square cut.
3. Corner Condition: Square.
4. Mounting: Unframed.

    a. Wall mounted with concealed anchors, two-face tape.
    b. Manufacturer's standard anchors for substrates encountered.

2.4 GRAPHIC LOGO SIGN

A.

2.5 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
2. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
4. Internally brace dimensional characters for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
5. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
6. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Back Bar and Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position, so that signage is correctly located and aligned.

C. Remove temporary protective coverings and strippable films as signs are installed.

END OF SECTION 101419

SECTION 102113.19 - PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Solid-plastic toilet compartments configured as toilet enclosures and urinal screens.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for blocking.
2. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories mounted on toilet compartments.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

B. Shop Drawings: For toilet compartments.

1. Include plans, elevations, sections, details, and attachment details.
2. Show locations of cutouts for compartment-mounted toilet accessories.
3. Show locations of centerlines of toilet fixtures.
4. Show locations of floor drains.
5. Show overhead support or bracing locations.

C. Samples for Initial Selection: For each type of toilet compartment material indicated.

1. Include Samples of hardware and accessories involving material and color selection.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents and source.

1. Door Hinges: One hinge(s) with associated fasteners.
2. Latch and Keeper: One latch(es) and keeper(s) with associated fasteners.
3. Door Bumper: One bumper(s) with associated fasteners.
4. Door Pull: One door pull(s) with associated fasteners.
5. Fasteners: Ten fasteners of each size and type.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Toilet partitions shall be tested in accordance with NFPA 286; testing by a qualified testing agency. Materials shall comply with Authorities Having Jurisdiction for fire performance and smoke development.

B. Regulatory Requirements: Comply with applicable provisions in ICC A117.1 for toilet compartments designated as accessible.

2.2 SOLID-PLASTIC TOILET COMPARTMENTS

A. Manufacturers: Basis of design; Hiny Hiders Partitions by Scranton Products, subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include the following listed manufacturer/product, any deviation from the requirements requires approval by the architect:

1. Accurate Partitions Corporation.
2. All American Metal Corp.
3. American Sanitary Partition Corporation.
4. Ampco, Inc.
5. Bradley Corporation; Mills Partitions.
6. General Partitions Mfg. Corp.
7. Global Steel Products Corp.
8. Hadrian Manufacturing Inc.
9. Knickerbocker Partition Corporation.
10. Marlite.
11. Metpar Corp.
12. Partition Systems Incorporated of South Carolina; Columbia Partitions.
13. Scranton Products.
14. Weis-Robart Partitions, Inc.

B. Toilet-Enclosure Style: Overhead braced.

C. Urinal-Screen Style: Wall hung.

D. Door, Panel, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, and with homogenous color and pattern throughout thickness of material.

1. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum or stainless-steel strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
2. Color and Pattern: One color and pattern in each room as selected by Architect from manufacturer's full range.

E. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters; with shoe matching that on the pilaster.

F. Brackets (Fittings):

1. Full-Height (Continuous) Type: stainless steel.

2.3 HARDWARE AND ACCESSORIES

A. Hardware and Accessories: Manufacturer's heavy-duty operating hardware and accessories.

1. Hinges: Manufacturer's minimum 0.062-inch- thick stainless-steel paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees, allowing emergency access by lifting door. Mount with through-bolts.
2. Latch and Keeper: Manufacturer's heavy-duty surface-mounted cast-stainless-steel latch unit designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through-bolts.
3. Coat Hook: Manufacturer's heavy-duty combination cast-stainless-steel hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories. Mount with through-bolts.
4. Door Bumper: Manufacturer's heavy-duty rubber-tipped cast-stainless-steel bumper at out-swinging doors. Mount with through-bolts.
5. Door Pull: Manufacturer's heavy-duty cast-stainless-steel pull at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through-bolts.

B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.

C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.4 MATERIALS

A. Aluminum Extrusions: ASTM B 221.

B. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.

C. Stainless-Steel Castings: ASTM A 743/A 743M.

2.5 FABRICATION

A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.

B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

C. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at bottoms of posts. Provide shoes at posts to conceal anchorage.

D. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, in-swinging doors for standard toilet compartments and 36-inch- wide, out-swinging doors with a minimum 32-inch- wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.

1. Confirm location and adequacy of blocking and supports required for installation.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

1. Maximum Clearances:

a. Pilasters and Panels: 1 inch.
b. Panels and Walls: 1 inch.

2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.

a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
b. Align brackets at pilasters with brackets at walls.

B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels and adjust so tops of doors are parallel with overhead brace when doors are in closed position.

C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113.19

SECTION 102239 - FOLDING PANEL PARTITIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Electrically operated, acoustical panel partitions.

B. Related Requirements:

1. Section 055000 "Metal Fabrications" for supports that attach supporting tracks to overhead structural system.
2. Section 092900 "Gypsum Board" for sound barrier construction above the ceiling at track.
3. Electrical and communications Sections for electrical service and connections for motor operators, controls, and limit switches and for system disconnect switches.

1.3 DEFINITIONS

A. NIC: Noise Isolation Class.

B. NRC: Noise Reduction Coefficient.

C. STC: Sound Transmission Class.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For operable panel partitions.

1. Include plans, elevations, sections, attachment details, and numbered panel installation sequence.
2. Indicate stacking and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.

3. Include diagrams for power, signal, and control wiring.

C. Samples for Initial Selection: For each type of exposed material, finish, covering, or facing.

1. Include Samples of accessories involving color selection.

D. Samples for Verification: For each type of exposed material, finish, covering, or facing, prepared on Samples of size indicated below:

1. Textile Facing Material: Full width by not less than 36-inch- (914-mm-) long section of fabric from dye lot to be used for the Work, with specified treatments applied. Show complete pattern repeat.
2. Panel Facing Material: Manufacturer's standard-size unit, not less than 3 inches (75 mm) square.
3. Panel Marker Surface Material: Manufacturer's standard-size unit, not less than 3 inches (75 mm) square.
4. Panel Edge Material: Not less than 3 inches (75 mm) long.
5. Chair Rail: Manufacturer's standard-size unit, 6 inches (150 mm) long.
6. Hardware: One of each exposed door-operating device.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Partition track, track supports and bracing, switches, turning space, and storage layout.
2. Suspended ceiling components.
3. Structural members to which suspension systems will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Items penetrating finished ceiling including the following:

    a. Lighting fixtures.
    b. HVAC ductwork, outlets, and inlets.
    c. Speakers.
    d. Sprinklers.
    e. Smoke detectors.
    f. Access panels.

6. Plenum fire, smoke and acoustical barriers.

B. Setting Drawings: For embedded items and cutouts required in other work, including support-beam, mounting-hole template.

C. Qualification Data: For Installer.

D. Seismic Qualification Certificates: For operable panel partitions, tracks, accessories, and components, from manufacturer. Include seismic capacity of partition assemblies to remain in vertical position during a seismic event and the following:

1. Basis for Certification: Indicate whether certification is based on analysis, testing, or experience data, according to ASCE/SEI 7.

2. Detailed description of partition anchorage devices on which the certification is based and their installation requirements.

E. Product Certificates: For each type of operable panel partition.

1. Include approval letter signed by manufacturer acknowledging Owner-furnished panel facing material complies with requirements.

F. Product Test Reports: For each operable panel partition, for tests performed by a qualified testing agency.

G. Field quality-control reports.

H. Sample Warranty: For manufacturer's special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For operable panel partitions to include in maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Panel finish facings and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
b. Seals, hardware, track, track switches, carriers, and other operating components.
c. Electric operator and controls.

1.8 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same production run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Panel Finish-Facing Material: Furnish full width in quantity to cover both sides of two panels when installed.

1.9 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer. The products herein specified established the standard of quality for the operable wall.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Protectively package and sequence panels in order for installation. Clearly mark packages and panels with numbering system used on Shop Drawings. Do not use permanent markings on panels.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of operable panel partitions that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Faulty operation of operable panel partitions.
b. Deterioration of metals, metal finishes, and other materials beyond normal use.

B. Warranty Period: 2 years from date of Substantial Completion. Acoustical Performance: The operable wall shall retain its acoustical properties for 10 years from the date of shipment providing proper maintenance has been performed on the operable wall.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Operable panel partitions shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the partition panels will remain in place without separation of any parts when subjected to the seismic forces specified."

B. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:

1. Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E90, determined by ASTM E413, and rated for not less than the STC indicated.

C. Fire-Test-Response Characteristics: Provide panels with finishes complying with one of the following as determined by testing identical products by a testing and inspecting agency acceptable to authorities having jurisdiction:

1. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: **25** Insert value or less.
b. Smoke-Developed Index: 450 Insert value or less.

2. Fire Growth Contribution: Complying with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 OPERABLE ACOUSTICAL PANELS

A. Operable Acoustical Panels: Partition system, including panels, seals, finish facing, suspension system, operators, and accessories.

1. Basis –of-Design Product: Subject to compliance with requirements, provide Modernfold, Inc, Acousti-Seal Encore continuously hinged automated wall system, or equal. Manufacturers providing comparable products that may be incorporated into the Work include, but are not limited to, the following:

a. Hufcor, Inc.
b. Panelfold, Inc.

B. Panel Operation: Electrically operated, continuously hinged panels.

C. Panel Construction: As required to support panel from suspension components and with reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities. Panel Construction STC 56.

D. Dimensions: Fabricate operable acoustical panel partitions to form an assembled system of dimensions indicated and verified by field measurements.

1. Panel Width: As indicated.

E. STC: Not less than 56.

F. Panel Weight: 8 lb/sq. ft. (40 kg/sq. m) maximum.

G. Panel Thickness: As required to meet acoustical requirements.

H. Panel Materials:

1. Steel Frame: Steel sheet, manufacturer's standard nominal minimum thickness for uncoated steel.
2. Steel Face/Liner Sheets: Tension-leveled steel sheet, minimum nominal thickness for uncoated steel.
3. Aluminum: Alloy and temper recommended by aluminum producer and finisher for type of use, corrosion resistance, and finish indicated; ASTM B221 (ASTM B221M) for extrusions; manufacturer's standard strengths and thicknesses for type of use.

a. Frame Reinforcement: Manufacturer's standard steel or aluminum.

4. Gypsum Board: ASTM C1396/C1396M.
5. Cement Board: ASTM C1288.
6. Particleboard: ANSI A208.1.
7. Medium-Density Fiberboard: ANSI A208.2.
8. Plywood: DOC PS 1.

I. Panel Closure: Manufacturer's standard unless otherwise indicated.

J. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.

1. Hinges: Manufacturer's standard.

K. Finish Facing: Fabric wall covering, and marker surface as indicated.

2.3 SEALS

A. Description: Seals that produce operable panel partitions complying with performance requirements and the following:

1. Manufacturer's standard seals unless otherwise indicated.
2. Seals made from materials and in profiles that minimize sound leakage.
3. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended and closed.

B. Vertical Seals: Deep-nesting, interlocking steel astragals mounted on each edge of panel, with continuous, resilient acoustical seal.

C. Horizontal Top Seals: Manufacturers standard continuous-contact, constant-force-contact seal exerting uniform constant pressure on track when extended.

D. Horizontal Bottom Seals: Manufacturer's standard continuous-contact seal exerting uniform constant pressure on floor. floor when extended, ensuring horizontal and vertical sealing and resisting panel movement.

1. Automatically Operated for Acoustical Panels: Extension and retraction of bottom seal automatically operated by movement of partition, with operating range not less than 2 inches between retracted seal and floor finish.

2.4 PANEL FINISH FACINGS

A. Description: Finish facings for panels that comply with indicated fire-test-response characteristics and that are factory applied to operable panel partitions with appropriate backing, using mildew-resistant non-staining adhesive as recommended by facing manufacturer's written instructions.

1. Apply one-piece, seamless facings free of air bubbles, wrinkles, blisters, and other defects, with edges tightly butted, and with invisible seams complying with Shop Drawings for location, and] with no gaps or overlaps. Horizontal butted edges and seams are not permitted. Tightly secure and conceal raw and selvage edges of facing for finished appearance.
2. Where facings with directional or repeating patterns or directional weave are indicated, mark facing top and attach facing in same direction.

B. Fabric Wall Covering: Manufacturer's standard fabric, from same dye lot, treated to resist stains.

1. Color/Pattern: As selected by Architect from manufacturer's full range.

C. Paint: Manufacturer's standard factory painted finish.

1. Color: As selected by Architect from manufacturer's full range.

D. Cap-Trimmed Edges: Protective perimeter-edge trim with tight hairline joints concealing edges of panel and finish facing, finished as follows:

1. Steel, Painted: Finished with manufacturer's color as selected by Architect from manufacturer's full range.

E. Trimless Edges: Fabricate exposed panel edges so finish facing wraps uninterrupted around panel, covering edge and resulting in an installed partition with facing visible on vertical panel edges, without trim, for minimal sightlines at panel-to-panel joints.

2.5 SUSPENSION SYSTEMS

A. Tracks: Steel or aluminum with adjustable steel hanger rods for overhead support, designed for operation, size, and weight of operable panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch (2.54 mm) between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.

1. Panel Guide: Aluminum guide on both sides of the track to facilitate straightening of the panels; finished with factory-applied, decorative, protective finish.
2. Head Closure Trim: As required for acoustical performance; with factory-applied, decorative, protective finish.

B. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.

1. Multidirectional Carriers: Capable of negotiating intersections without track switches.

C. Aluminum Finish: Mill finish or manufacturer's standard, factory-applied, decorative finish unless otherwise indicated.

D. Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

2.6 ELECTRIC OPERATORS

A. Factory-assembled electric operation system of size and capacity recommended and provided by operable panel partition manufacturer for partition specified; with electric motor and factory-prewired motor controls, speed reducer, chain drive, control stations, control devices, and accessories required for operation. Include wiring from control stations to motor. Coordinate operator wiring requirements and electrical characteristics with building electrical system.

B. Comply with NFPA 70.

C. Control Equipment: Comply with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6.

D. Motor Electrical Characteristics:

1. Horsepower: Manufacturer's standard.
2. Volts: 208.
3. Hertz: 60.

E. Control Stations: Two single-key-operated, constant-pressure control stations located remotely from each other on opposite sides and opposite ends of partition run. Wire in series to require simultaneous activation of both key stations to operate partition. Each three-position control station labeled "Open," "Close," and "[Off] [Stop]." Furnish two keys per station.

F. Obstruction-Detection Devices: Equip each motorized operable panel partition with indicated automatic safety sensor that causes operator to immediately [shut off motor] [stop and reverse direction].

1. Sensor Edge: Contact-pressure-sensitive safety edge along partition's leading edge.

G. Limit Switches: Adjustable switches, interlocked with motor controls and set to automatically stop operable panel partition at fully extended and fully stacked positions.

H. Emergency Release Mechanism: Quick disconnect-release of electric-motor drive system, permitting manual operation in event of operating failure.

I. Electric Interlock: Equip each motorized operable panel partition with electric interlocks at locations indicated, to prevent operation of operable panel partition under the following conditions:

1. On storage pocket door, to prevent operation if door is not in fully open position.
2. On partitions at location of convergence by another partition, to prevent operation if merging partitions are in place.

2.7 ACCESSORIES

A. Work Surfaces: Quantities, placement, and size indicated.

1. Surface: Porcelain steel marker/projection surface.
2. Surface Color: As selected by Architect from manufacturer's full range.
3. Size: As indicated on Drawings.
4. Trim: Aluminum slip-on or snap-on trim with no visible screws or exposed joints and with corners mitered to a neat, hairline joint.

B. Chalk Tray and Eraser Pocket: Aluminum with clear anodic finish.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine flooring, floor levelness, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable panel partitions.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Comply with ASTM E 557 except as otherwise required by operable panel partition manufacturer's written installation instructions.

B. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed in area of partition installation.

C. Install panels in numbered sequence indicated on Shop Drawings.

D. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.

E. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.

F. Light-Leakage Test: Illuminate one side of partition installation and observe vertical joints and top and bottom seals for voids. Adjust partitions for alignment and full closure of vertical joints and full closure along top and bottom seals.

3.3 FIELD QUALITY CONTROL

A. NIC Testing: Engage a qualified testing agency to perform tests and inspections.

1. Testing Extent: Testing agency shall randomly select one operable panel partition installation(s) for testing.
2. Testing Methodology: Perform testing of installed operable panel partition for noise isolation according to ASTM E 336, determined by ASTM E 413, and rated for not less than NIC indicated. Adjust and fit partitions to comply with NIC test method requirements.

B. An operable panel partition installation will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports

3.4 ADJUSTING

A. Adjust operable panel partitions, hardware, and other moving parts to function smoothly, and lubricate as recommended by manufacturer.

B. Verify that safety devices are properly functioning.

3.5 MAINTENANCE SERVICE

A. Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 36 months' full maintenance by manufacturer's authorized service representative. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper operable-partition operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

3.6 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain operable panel partitions.

END OF SECTION 102239

SECTION 102700 – STANCHION EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Portable Retractable Belt Barrier Stanchions.
2. Stanchion storage Cart.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each product to include in maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of stanchion barriers that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain barrier stanchions from single source from a single manufacturer.

2.2 BARRIER STANCHIONS

A. Portable Retractable Belt Barrier Stanchions as manufactured by Crowd Control Warehouse or approved equal. www.crowdcontrolwarehouse.com

1. Model: CCW Series RBB-100 Retractable Belt Barrier.
2. Finish: Satin Stainless-Steel Post and Base.
3. Belt Length: 7-6” Ft.
4. Belt Color: Black
5. Base Protection: Full circumference rubber floor protector for maximum scratch protection & stability.
6. Belt Brake: Built-in belt brake system to ensure slow, safe belt retraction (no snapback!).
7. Stanchion Head: Four way.

2.3 STANCHIONS STORAGE CART

A. Stanchions Storage Cart as manufactured by Crowd Control Warehouse or approved equal. www.crowdcontrolwarehouse.com

1. Model: CCW 18-Post Stanchion Storage Cart or approved equal compatible with stanchions.

2.4 FINISHES

A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 SCHEDULE

A. Quantity: Provide a total of 20 stanchions with belts.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine product conditions and finish.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Before installation, clean finish surface to remove dust, debris, and loose particles.

3.3 CLEANING

A. Immediately after completion of installation, clean as recommended by manufacturer.

3.4 INSTALLATION

A. After substantial completion, inspect with architect and then store at direction of Owner.

END OF SECTION 102700

SECTION 102800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Warm-air dryers.
3. Childcare accessories.
4. Under-lavatory guards.
5. Custodial accessories.

B. Owner-Furnished Material:
1. Paper towel dispensers, contractor installed.
2. Soap dispensers, contractor installed.
3. Toilet tissue dispensers, contractor installed.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:
1. Construction details and dimensions.
2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Material and finish descriptions.
4. Features that will be included for Project.
5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
1. Identify locations using room designations indicated.
2. Identify products using designations indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.6 QUALITY ASSURANCE

A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.7 COORDINATION

A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.8 WARRANTY

A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch minimum nominal thickness unless otherwise indicated.

B. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.

C. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).

D. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

E. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings by Bobrick Washroom Equipment, Inc. or comparable product by one of the following:
   1. A & J Washroom Accessories, Inc.

2. American Specialties, Inc.
3. Bradley Corporation.
4. GAMCO Specialty Accessories
5. Tubular Specialties Manufacturing, Inc.

B. Grab Bar (TA1)):
1. Basis-of-Design Product: Bobrick #B6806.99 Series, straight grab bar with concealed flanges.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
   a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
4. Outside Diameter: 1-1/2 inches.
5. Grab Bar L-Configuration: GB1
   a. 1- 42 inches long, horizontal
   b. 1-36 inches long, horizontal
   c. 1-18 inches long, vertical

C. Feminine Napkin Disposal Unit (ND):
1. Basis-of-Design Product: Bobrick #B-270, Surface-mounted sanitary napkin disposal.
2. Mounting: Surface mounted.
3. Receptacle: with disposable paper liners.
4. Door or Cover: Top opening lid with integral finger depression.
5. Material and Finish: Stainless steel, No. 4 finish (satin).

D. Toilet Paper Dispensers (TA2)
1. Provided by owner, contractor installed.

E. Soap Dispenser (TA7)

1. Provided by owner, contractor installed

F. Paper Towel Dispensers (TA3)

1. Provided by owner, contractor installed

G. Mirror Unit (MI, M2 and M3):
1. Basis-of-Design Product: Bobrick #B290
2. Frame: Stainless-steel angle, 0.05 inch thick.
   a. Corners: Welded and ground smooth.
3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
   a. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
4. Size:
   a. M1 – 24" wide x 36" high
   b. M2 – 24" wide x 48" high
   c. M3 – width of vanity x 42" high framed

2.3 WARM-AIR DRYERS

A. Basis-of-Design Product: Subject to compliance with requirements, provide Dyson Airblade dB Surface-mounted hand dryer or comparable product by one of the following:

1. A & J Washroom Accessories, Inc.
2. American Dryer, Inc.
3. American Specialties, Inc.
4. Bobrick Washroom Equipment, Inc.
5. Bradley Corporation.
6. Excel Dryer Corporation.
7. GAMCO Specialty Accessories
8. World Dryer Corporation.

B. Warm-Air Dryer (TA5):
1. Basis-of-Design Product: Dyson Airblade DB hand dryer.
2. Mounting: Surface mounted.
3. Operation: Electronic-sensor activated with timed power cut-off switch.
   a. Operation Time: 30 seconds.
4. Cover Material and Finish: One-piece Polycarbonate-ABS casing.
5. Electrical Requirements: 120V, 1400w.

2.4 CHILDCARE ACCESSORIES

A. Basis-of-Design Product: Subject to compliance with requirements, provide KB2200, Horizontal wall-mounted baby changing station by Koala Kare Products or comparable product by one of the following:

1. American Specialties, Inc.
2. Brocar Products, Inc.
3. Diaper Deck & Company, Inc.
4. SSC, Inc.
5. Tubular Specialties Manufacturing, Inc.

B. Baby Changing Station (TA8):

1. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
   a. Engineered to support a minimum of 250-lb static load when opened.
2. Mounting: Surface mounted, with unit projecting not more than 4 inches from wall when closed.
3. Operation: By pneumatic shock-absorbing mechanism.
4. Material and Finish: HDPE, standard grey finish.

2.5 UNDERLAVATORY GUARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Plumberex Specialty Products, Inc.: Trap & Gear (800) 475-8629
2. IPS Corp.: Soft-Guard Plus (800) 888-8312

B. Underlavatory Guard :
1. Description: ADA compliant insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.

2. Material and Finish: Antimicrobial, molded plastic, white.

2.6 FABRICATION

A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

SECTION 104413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fire-protection cabinets for the following:

a. Portable fire extinguishers.

B. Related Requirements:

1. Section 104416 "Fire Extinguishers."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.

B. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.5 COORDINATION

A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

1.6 SEQUENCING

A. Apply vinyl lettering on field-painted fire-protection cabinets after painting is complete.

PART 2 - PRODUCTS

2.1 FIRE-PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

B. Cabinet Construction: .

C. Cabinet Material: Cold-rolled steel.

1. Shelf: Same metal and finish as cabinet.

D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
1. Rolled-Edge Trim: 2-1/2-inch backbend depth.

E. Cabinet Trim Material: Steel sheet

F. Door Material: Steel sheet.

G. Door Style: Fully glazed panel with frame.

H. Door Glazing: Tempered float glass (clear).

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide manufacturer's standard.

J. Accessories:

1. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.

K. Materials:

1. Sheet Steel:

a. Finish: WHITE

2.2 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.
3. Prepare doors and frames to receive locks.
4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
1. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.3 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire-protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire-protection cabinets in locations and at mounting heights indicated

1. Fire-Protection Cabinets: 54 inches above finished floor to top of cabinet.

B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semirecessed fire-protection cabinets.
2. Provide inside latch and lock for break-glass panels.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.

E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

B. Related Requirements:

1. Section 104413 "Fire Protection Cabinets."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.6 COORDINATION

A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.7 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Failure of hydrostatic test according to NFPA 10.
b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Amerex Corporation.
b. Ansul Incorporated.
c. Badger Fire Protection.
d. Guardian Fire Equipment, Inc.
e. JL Industries, Inc.; a division of the Activar Construction Products Group.
f. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
g. Larsens Manufacturing Company.
h. Potter Roemer LLC.

2. Valves: Manufacturer's standard.
3. Handles and Levers: Manufacturer's standard.
4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Multipurpose Dry-Chemical Type in Steel Container : UL-rated 3A:40B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or black baked-enamel finish.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Amerex Corporation.
b. Ansul Incorporated.

c. Badger Fire Protection.
d. Guardian Fire Equipment, Inc.
e. JL Industries, Inc.; a division of the Activar Construction Products Group.
f. Larsens Manufacturing Company.
g. Potter Roemer LLC.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 105113 - METAL LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Knockdown, metal lockers.
2. Pad-locks and keyed override.

B. Related Sections include the following:
1. Division 1 Section "Construction Waste Management" for handling of product rejects, scrap, waste materials, and packing materials.
2. Division 6 Section "Rough carpentry" furring, blocking, and shims required for installing metal lockers and concealed within other construction before metal locker installation.

1.3 DEFINITIONS

A. Uncoated Steel Sheet Thicknesses: Indicated as the minimum thicknesses.

1.4 SUBMITTALS

A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker and bench.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Show base, filler panels, and other accessories.
2. Include locker identification system.

C. Samples for Verification: For metal lockers, in manufacturer's standard sizes.

D. Quality Assurance Submittals:

1. Qualification Data: For Installer.

E. Project Closeout Submittals:

1. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

2. Warranty: Special warranty specified in this Section.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative of metal locker manufacturer for installation and maintenance of units required for this Project.

B. Source Limitations: Obtain metal lockers and accessories through one source from a single manufacturer.

C. Product Options: Drawings indicate size, profiles, and dimensional requirements of metal lockers and are based on the specific system indicated. Refer to Division 1 Section "Product Requirements."

D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for metal locker installation.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify the following by field measurements before fabrication and indicate measurements on Shop Drawings:

1. Concealed framing, blocking, and reinforcements that support metal lockers before they are enclosed.
2. Recessed openings.
3. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish recessed opening dimensions and proceed with fabricating metal lockers without field measurements. Coordinate wall and floor construction to ensure that actual recessed opening dimensions correspond to established dimensions.

1.8 COORDINATION

A. Coordinate size and location of metal bases for metal lockers.

B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.

1. Failures include, but are not limited to, the following:

   a. Structural failures.
   b. Faulty operation of latches and other door hardware.

2. Damage from deliberate destruction and vandalism is excluded.
3. Warranty Period for All-Welded Metal Lockers: 10 years from date of Substantial Completion.

1.10 EXTRA MATERIALS

A. Furnish extra materials described below, before construction begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Full-size units of the following metal locker hardware items for 5 units:
   a. Identification plates.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS) Type B, suitable for exposed applications.

B. Fasteners: Zinc- or nickel-plated steel, slotless-type exposed bolt heads, and self-locking nuts or lock washers for nuts on moving parts.

C. Anchors: Select material, type, size, and finish required for secure anchorage to each substrate.

1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance.
2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.2 WELDED METAL LOCKERS

A. Basis-of-Design Product: The design for the metal lockers is based on products by Lyon Workspace Products. Subject to compliance with the requirements, products of the following manufacturers which are similar in quality and general characteristics will be considered upon review and approval by the Architect.

1. Welded, Standard Metal Lockers:

   a. Penco Products, Inc., Subsidiary of Vesper Corporation; Lockers.
   b. DeBourgh Mfg. Co.; Lockers.
   c. List Industries Inc.; Lockers.
   d. Republic Storage Systems Company; Lockers.

e. Art Metal Products, Div. of Fort Knox Storage Co.

B. Locker Type & Size:

1. Locker Rooms: Four Tier, 15” wide x 15” deep x 60” high, standard color to be selected by Architect from manufacturer’s standard range of colors.

C. Frames: 16 gauge channel formed; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral door strike full height on vertical main frames.

D. Doors: 16 gauge with diagonal reinforcing and vented fronts.

E. Locker Base: Structural channels formed from 0.0677-inch- (1.7-mm-) thick, cold-rolled steel sheet; welded to front and rear of side-panel frames at Locker Rooms.

F. Hinges: Self-closing; welded to door and attached to door frame with not less than 2 factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.

1. Continuous Hinges: Manufacturer's standard, steel continuous hinge; side mounted as required by locker configuration.

G. Door Handle and Latch for Box Lockers: 16 ga door pull with padlock attachment for user provided padlock.

H. Equipment: Equip each metal locker with identification plate

I. Accessories:

1. Continuous Base: 6 inches (152 mm) high; fabricated from 0.0677-inch- (1.7-mm-) thick, cold-rolled steel sheet at locker rooms (none at vehicle canopy).
2. Filler Panels: Fabricated from 0.0428-inch- (1.1-mm-) thick, cold-rolled steel sheet.
3. Group Ends: As required for each run of lockers.

2.3 FABRICATION

A. General: Fabricate metal lockers square, rigid, and without warp; with metal faces flat and free of dents or distortion. Make exposed metal edges free of sharp edges and burrs, and safe to touch.

1. Form body panels, doors, shelves, and accessories from one-piece steel sheet, unless otherwise indicated.
2. Provide fasteners, filler plates, supports, clips, and closures as required for a complete installation.

B. Unit Principle: Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.

C. All-Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections, with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds flush.

D. Identification Plates: Manufacturer's standard etched, embossed, or stamped aluminum plates; with numbers and letters at least 3/8 inch (9 mm) high.

E. Base: 16 Gauge Zee Base.

F. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip joint filler angle formed to receive filler panel.

2.4 STEEL SHEET FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Factory finish steel surfaces and accessories except stainless steel and chrome-plated surfaces.

C. Surface Preparation: Clean surfaces of dirt, oil, grease, mill scale, rust, and other contaminants that could impair paint bond. Use manufacturer's standard methods.

D. Baked-Enamel Finish: Immediately after cleaning, pretreating, and phosphatizing, apply manufacturer's standard thermosetting baked-enamel finish. Comply with paint manufacturer's written instructions for application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General: Install level, plumb, and true; shim as required, using concealed shims.

1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches (910 mm) o.c. Install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion, using concealed fasteners.
2. Anchor single rows of metal lockers to walls near top and bottom of lockers.

B. All-Welded Metal Lockers: Connect groups of all-welded metal lockers together with standard fasteners, with no exposed fasteners on face frames.

C. Equipment and Accessories: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.

1. Attach hooks with at least two fasteners.
2. Attach door locks on doors using security-type fasteners.
3. Identification Plates: Identify metal lockers with identification indicated on Drawings.

    a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
4. Attach filler panels with concealed fasteners. Locate fillers panels where indicated on Drawings.

3.3 ADJUSTING, CLEANING, AND PROTECTION

A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding.

B. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit metal locker use during construction.

C. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by metal locker manufacturer.

END OF SECTION 105113

SECTION 114000 - FOODSERVICE EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Under Counter Refrigerator.
2. Commercial Blender.
3. Ice Machine Dispenser.
4. Undercounter Dishwasher.
5. Espresso Grinder.
6. Espresso Machine.
7. Under Counter Ice Machine.

B. Owner-Furnished Equipment: Where indicated, Owner will furnish equipment for installation by Contractor.

1.3 COORDINATION

A. Coordinate foodservice equipment layout and installation with other work, including layout and installation of lighting fixtures, HVAC equipment, and fire-suppression system components.

B. Coordinate locations and requirements of utility service connections.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product. Include the following:

1. Manufacturer's model number.
2. Accessories and components that will be included for Project.
3. Clearance requirements for access and maintenance.
4. Utility service connections for water, drainage, power, and fuel; include roughing-in dimensions.

B. Shop Drawings: For fabricated equipment. Include plans, elevations, sections, roughing-in dimensions, fabrication details, utility service requirements, and attachments to other work.

C. Samples for Initial Selection: For units with factory-applied color finishes.

D. Samples for Verification: For each factory-applied color finish required, in manufacturer's standard sizes.

1.6 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: For foodservice facilities.

1. Indicate locations of foodservice equipment and connections to utilities.
2. Key equipment using same designations as indicated on Drawings.
3. Include plans and elevations; clearance requirements for equipment access and maintenance; details of equipment supports; and utility service characteristics.
4. Include details of seismic bracing for equipment.

B. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For foodservice equipment to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Product Schedule: For each foodservice equipment item, include the following:

1) Designation indicated on Drawings.
2) Manufacturer's name and model number.
3) List of factory-authorized service agencies including addresses and telephone numbers.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify actual dimensions of construction contiguous with foodservice equipment by field measurements before fabrication. Indicate measurements on Coordination Drawings.

1.9 WARRANTY

A. Refrigeration Compressor Warranty: Manufacturer agrees to repair or replace compressors that fail in materials or workmanship within specified warranty period.

1. Failure includes, but is not limited to, inability to maintain set temperature.
2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. NSF Standards: Provide equipment that bears NSF Certification Mark or UL Classification Mark certifying compliance with applicable NSF standards.

B. UL Certification: Provide electric and fuel-burning equipment and components that are evaluated by UL for fire, electric shock, and casualty hazards according to applicable safety standards, and that are UL certified for compliance and labeled for intended use.

C. Regulatory Requirements: Install equipment to comply with the following:

1. ASHRAE 15, "Safety Code for Mechanical Refrigeration."
2. NFPA 70, "National Electrical Code."
3. NFPA 96, "Ventilation Control and Fire Protection of Commercial Cooking Operations."

D. Seismic Restraints: Comply with SMACNA's "Kitchen Ventilation Systems and Food Service Equipment Fabrication and Installation Guidelines," Appendix A, "Seismic Restraint Details," unless otherwise indicated.

2.2 FOODSERVICE EQUIPMENT

A. Provide the following coffee shop equipment:

1. Under Counter Refrigerator.
2. Commercial Blender.
3. Ice Machine Dispenser.
4. Undercounter Dishwasher.
5. Espresso Grinder.
6. Espresso Machine.
7. Under Counter Ice Machine.

B. Manufacturer and Model: As indicated on the drawings.

C. Location: As indicated on the drawings.

2.3 MISCELLANEOUS MATERIALS

A. Installation Accessories, General: NSF certified for end-use application indicated.

B. Elastomeric Joint Sealant: ASTM C920; silicone. Type S (single component), Grade NS (nonsag), Class 25, Use NT (nontraffic) related to exposure, and Use M, G, A, or O as applicable to joint substrates indicated.

1. Public Health and Safety Requirements:

a. Sealant is certified for compliance with NSF standards for end-use application indicated.

b. Washed and cured sealant complies with the FDA's regulations for use in areas that come in contact with food.

2. Cylindrical Sealant Backing: ASTM C1330, Type C, closed-cell polyethylene, in diameter greater than joint width.

2.4 FINISHES

A. Stainless Steel Finishes:

1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
2. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

a. Run grain of directional finishes with long dimension of each piece.
b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

B. Powder-Coat Finishes: Immediately after cleaning and pretreating, electrostatically apply manufacturer's standard, baked-polymer, thermosetting powder finish. Comply with resin manufacturer's written instructions for application, baking, and minimum dry film thickness.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install foodservice equipment level and plumb, according to manufacturer's written instructions.

1. Connect equipment to utilities.
2. Provide cutouts in equipment, neatly formed, where required to run service lines through equipment to make final connections.

B. Complete equipment assembly where field assembly is required.

1. Provide closed butt and contact joints that do not require a filler.
2. Grind field welds on stainless steel equipment until smooth and polish to match adjacent finish.

C. Install equipment with access and maintenance clearances that comply with manufacturer's written installation instructions and with requirements of authorities having jurisdiction.

D. Install cabinets and similar equipment on bases in a bed of sealant.

E. Install closure-trim strips and similar items requiring fasteners in a bed of sealant.

F. Install joint sealant in joints between equipment and abutting surfaces with continuous joint backing unless otherwise indicated. Produce airtight, watertight, vermin-proof, sanitary joints.

3.2 CLEANING AND PROTECTING

A. After completing installation of equipment, repair damaged finishes.

B. Clean and adjust equipment as required to produce ready-for-use condition.

C. Protect equipment from damage during remainder of the construction period.

3.3 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain foodservice equipment.

END OF SECTION 114000

SECTION 121230 – ART HANGING DISPLAY SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Section 061000 - Rough Carpentry

1.2 SUMMARY

A. Section Includes:

1. Hanging display system including the following:
   a. Display Reveal System

1.3 ACTION SUBMITTALS

A. Submit under provisions of Section 013000 - Administrative Requirements.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Verification Samples: For each finish product specified, two samples, minimum size 6 inches square representing actual product, color, and patterns.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: Minimum 5 years’ experience manufacturing similar products.

B. Installer Qualifications: Minimum 2 years’ experience installing similar products.

1.5 PRE-INSTALLATION MEETINGS

A. Convene minimum two weeks prior to starting work of this section.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store products in manufacturer's unopened packaging bearing the brand name and manufacturer's identification until ready for installation.

B. Handling: Handle materials to avoid damage.

1.7 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.8 SEQUENCING

A. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.9 WARRANTY

A. Warranty: Submit manufacturer's standard limited one-year warranty.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design Manufacturer: AS Hanging Display Systems, which is located at: 8396 State Route 9; West Chazy, NY 12992 ; Toll Free Tel: 866-935-6949 ; Email: request info (info@ashanging.com); Web: https://www.ashanging.com

B. Requests for substitutions will be considered in accordance with provisions of Section 016000 - Product Requirements.

2.2 REVEAL HANGING AND DISPLAY SYSTEM

A. Basis of Design: Display Reveal System as manufactured by AS Hanging Display Systems. Provide materials and components required to provide a complete system by AS Hanging Display Systems for hanging display of artwork, with reveal track, cable and accessories as indicated or scheduled. Refer to Drawings.
   1. Configuration: Suspended Cable
   2. Aesthetic: Flush-mounted (sub-surface) reveal that doubles as a track.
   3. Display Reveal: Imbedded within wall, with no exposed fasteners.
   4. Track Weight Capacity: minimum of 110 lb./linear foot.
   5. Vertical Component: Stainless cables.

B. Display Reveal: Aluminum.
   1. Part Number: As indicated on the drawings.
   2. Finish: Silver, satin anodized.

C. Vertical Component/Cable:
   1. Part Number: As indicated on the drawings.

2. Cable: P-End Stainless Steel Cable. Minimum weight capacity; 45 lbs
3. Cable Length: 48 inches.
4. Review in field with Architect the options to coil the standard-length cable to 30” or cut to size and fuse in the field.

D. Hooks: Self Gripping Hooks
1. Part Number: As indicated on the drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions, approved submittals, and in proper relationship with adjacent construction.

B. Reveal Hanging and Display System: Review additional mounting and blocking requirements and verify that adequate blocking is provided.

3.4 CLEANING

A. Clean installed system and remove excess materials.

B. Deliver any unused cable and fittings to Owner.

3.5 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 121230

SECTION 122200 – CURTAINS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Curtain.
2. Curtain Tracks.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Curtain Tracks: Include maximum weights of curtains that can be supported.
2. Coil Mesh

B. Shop Drawings:

1. Curtain Tracks: Show installation and anchorage details and locations of controls.
2. Curtains: Show sizes, locations, and details of installation.

C. Samples: As follows:

1. Curtain Tracks: 18 inches long, with carriers, controls, and accessories.
2. Curtain Fabrics and Coil Mesh: For each color and pattern indicated, full width by 36 inches long, from dye lot to be used for the Work and with specified textile treatments applied. Show complete pattern repeat if any. Mark top and face of fabric.
3. Textile Trims: For each color and pattern indicated, 18 inches long.
4. Curtain Fabrication: For each heading, fabric, color, and pattern indicated, a complete full-size panel to verify details of fabrication and thread colors.

D. Product Schedule: For curtains and curtain tracks. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: For curtain track installation; reflected ceiling plans drawn to scale and coordinating track installation with openings and ceiling-mounted items, on which the following items are shown:

1. Suspended ceiling components.

B. Product Certificates: For each curtain fabric treated with flame retardant, signed by fabric supplier and indicating treatment durability and cleaning procedures required to maintain treatment effectiveness.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For products installed to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Curtain Track Carriers: For each size indicated, equal to 5 percent of amount installed, but no fewer than 10 of each size.
2. Curtain Track Controls: For each type indicated, equal to 5 percent of amount installed, but no fewer than 10 of each type.
3. Curtain Fabrics and Coil Mesh: For each fabric, color, and pattern indicated, from the same product run, full-width lengths equal to 5 percent of amount installed, but no fewer than 10 yards of each fabric, color, and pattern.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: For curtains and curtain tracks, fabricator of curtains.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build mockup at location and in size shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 FIELD CONDITIONS

A. Field Measurements: Verify dimensions by field measurements before curtain fabrication, and indicate measurements on Shop Drawings.

B. Scheduling: Do not deliver or install curtains until after other finish work, including painting, is complete and spaces are otherwise ready for occupancy.

PART 2 - PRODUCTS

2.1 CURTAIN TRACKS

A. Manually Operated Track: Fixed

1. Construction: Extruded aluminum, slotted for mounting at interval of not more than 24 inches o.c., and bendable to radii indicated.

    a. Lengths and Configurations: As indicated on Drawings.
    b. Support Capability: Weight of curtain or coil mesh indicated mounted on track length indicated.
    c. Finish: Manufacturer's standard.

2. Mounting Brackets: Aluminum, of type suitable for fastening track to surface indicated and designed to support weight of track assembly and curtain plus force applied to operate track.

    a. Mounting Surface: As indicated on drawings.
    b. Size: Adjustable.

3. Installation Fasteners: Sized to support track assembly and curtain, and fabricated from metal compatible with track, brackets, and supporting construction. Provide two fasteners to fasten each bracket to supporting construction.
4. Operation: Baton.

    a. Draw: One way, stack as indicated on Drawings.
    b. Operating Hardware Location: On stack side.

5. Carriers: Coordinate with curtain headings indicated.

    a. Master Carriers: Butt.

6. End Stops: Manufacturer's standard with track end cap.
7. Track Support: Suspended from Unistrut as indicated.

2.2 CURTAINS

A. Source Limitations: Obtain each color and pattern of curtain fabric and trim from one dye lot.

B. Coil Curtain:

1. Curtain: Subject to compliance with requirements of this specification, provide the curtain products as indicated in the Finish Legend provided on the individual Finish Plans.
2. Coil Curtain manufactured by other manufacturers may be considered, provided deviations in project performance, recycled content, details, dimensions, textures, style, patterns and colors are minor and do not change the design concept as judged by the Architect. The burden of proof is on the proposer

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2.3 CURTAIN FABRICATION

A. Seams: Not allowed

B. Side Hems: Manufactures standard or as indicated.

C. Bottom Hems: Manufactures standard or as indicated.

PART 3 - EXECUTION

3.1 CURTAIN TRACK INSTALLATION

A. Install track systems according to manufacturer's written instructions, level and plumb, and at height and location in relation to adjoining openings as indicated on Drawings.

B. Isolate metal parts of tracks and brackets from concrete, masonry, and mortar to prevent galvanic action. Use tape or another method recommended in writing by track manufacturer.

3.2 CURTAIN INSTALLATION

A. Where curtains abut overhead construction, hang curtain track as indicated.

B. Where curtains extend to floor, install so that bottom hems clear finished floor by not more than 1 inch and not less than 1/2 inch.

3.3 ADJUSTING

A. After hanging curtains, test and adjust each curtain track to produce unencumbered, smooth operation.

B. Steam and dress down curtains as required to produce crease- and wrinkle-free installation.

C. Remove and replace curtains that are stained, soiled or damaged.

END OF SECTION 122200

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Manually operated roller shades with single rollers.
2. Motor-operated roller shades with single and double rollers.

B. Related Requirements:

1. Section 061000 "Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.
2. Section 079200 "Joint Sealants" for sealing the perimeters of installation accessories for light-blocking shades with a sealant.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified, 10 inches long.

D. Product Schedule: For roller shades. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: For each type of shadeband material.

C. Product Test Reports: For each type of shadeband material, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roller shades to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than two units.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

A. Basis-of-Design Manufacturer: Mechoshade Systems Inc. as indicated in the drawings or a product by one of the following:

1. Draper Inc.
2. Insolroll Window Shading Systems.
3. Skyco Shading Systems Manual Shades

B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.

1. Bead Chains: Stainless steel.

a. Loop Length: Full length of roller shade.
b. Limit Stops: Provide upper and lower ball stops.
c. Chain-Retainer Type: Clip, jamb mount.

2. Spring Lift-Assist Mechanisms: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.

a. Provide for shadebands that weigh more than 10 lb or for shades as recommended by manufacturer, whichever criterion is more stringent.

C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: Right side of interior face of shade <**Insert requirements**>.
2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.
3. Shadeband-to-Roller Attachment: Manufacturer's standard method.

D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

E. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.

F. Shadebands:

1. Shadeband Material: Light-filtering fabric.
2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

a. Type: Enclosed in sealed pocket of shadeband material.
b. Color and Finish: As selected by Architect from manufacturer's full range.

G. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.

a. Shape: L-shaped Insert requirements.
b. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than 3 inches.

2. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.

a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than height indicated on Drawings.
b. Provide pocket with lip at lower edge to support acoustical ceiling panel.

3. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.

a. Closure-Panel Width: 2 inches.

4. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.3 MOTOR-OPERATED, SINGLE-ROLLER SHADES

A. Basis-of-Design Manufacturer: Mechoshade Systems Inc. as indicated in the drawings or a product by one of the following:

1. Draper Inc.
2. Insolroll Window Shading Systems.
3. Skyco Shading Systems Shades

B. Motorized Operating System: Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.

1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Electric Motor: Manufacturer's standard tubular, enclosed in roller.

a. Electrical Characteristics: 110-V ac.
b. Maximum Total Shade Width: As required to operate roller shades indicated.
c. Maximum Shade Drop: As required to operate roller shades indicated.

d. Maximum Weight Capacity: As required to operate roller shades indicated.

3. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for recessed or flush mounting. Provide the following for remote-control activation of shades:

   a. Central Control Station: Locate panel at circulation desk and provide boosters as required. Create separate control zones as directed by Architect.
   b. Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features; isolated from voltage spikes and surges.
   c. Color: As selected by Architect from manufacturer's full range.

4. Limit Switches: Adjustable switches interlocked with motor controls and set to stop shades automatically at fully raised and fully lowered positions.
5. Operating Features:

   a. Group at circulation the central switching with integrated switch control; single faceplate for multiple switch cutouts.
   b. Capable of accepting input from building automation control system.
   c. Override switch.

C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: Right side of interior face of shade.
2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller.
3. Shadeband-to-Roller Attachment: Manufacturer's standard method.

D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

E. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers that are operated by one roller drive-end assembly.

F. Shadebands:

1. Shadeband Material: Light-filtering fabric and Light-blocking fabric.
2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

   a. Type: Enclosed in sealed pocket of shadeband material.
   b. Color and Finish: As selected by Architect from manufacturer's full range.

G. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.

   a. Shape: L-shaped.
   b. Height: Manufacturer's standard height required to conceal roller and shadeband assembly when shade is fully open, but not less than 3 inches.

2. Endcap Covers: To cover exposed endcaps.
3. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.

    a. Height: Manufacturer's standard height required to enclose roller and shadeband assembly when shade is fully open, but not less than height indicated on Drawings.
    b. Provide pocket with lip at lower edge to support acoustical ceiling panel.

4. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.

    a. Closure-Panel Width: 2 inches.
5. Installation Accessories Color and Finish: As selected from manufacturer's full range.

2.4 SHADEBAND MATERIALS

A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.

1. Source: Roller shade manufacturer.
2. Type: Mechoshade,Thermoveil Dense Basket Weave, 1300 Series.
3. Openness Factor: 5 percent.
4. Color: 1319 Silber Birch.

2.5 ROLLER SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.

B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F:

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.

C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:

1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, locations of connections to building electrical system, and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

1. Opaque Shadebands: Located so shadeband is not closer than 2 inches to interior face of glass. Allow clearances for window operation hardware.

B. Electrical Connections: Connect motor-operated roller shades to building electrical system.

C. Roller Shade Locations: At exterior windows and other interior locations as indicated on Drawings.

3.3 ADJUSTING

A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

3.4 CLEANING AND PROTECTION

A. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.

B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

C. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.

END OF SECTION 122413

SECTION 123100 – UPHOLSTERED FURNISHINGS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes movable furniture as scheduled herein, to include:

1. Upholstered booth seating.

1.2 PERFORMANCE REQUIREMENTS

A. Support Capability: Able to support an evenly distributed 50-pound per square foot static load or 300-pound concentrated load without failure or other conditions that might impair furniture's usefulness.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Provide upholstered furniture which complies with California Technical Bulletin No. 117.
2. Upholstered furniture foam components must meet or exceed ASTM D-3574 Standard Test Method for Flexible Cellular Materials.
3. All components must meet or exceed all applicable national standards for furniture safety and durability, including but not limited to the following:
    a. ANSI/BIFMA X5.1, X5.5 and X5.7.

B. Forest Certification: Provide wood furniture produced from wood obtained from managed forests certified by a Forest Stewardship Council (FSC)- or Sustainable Forestry Initiative (SFI)-accredited certification body.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which the manufacturer agrees to repair or replace movable furniture that fails in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures, including excessive deflection, that impair furniture's usefulness.
2. Faulty operation of hardware.
3. Deterioration of finishes and other materials beyond normal wear.
    a. Warranty Period: Not less than ten (10) years from Notice of Acceptance.

PART 2 - PRODUCTS

2.1 BUILT IN FURNITURE

A. Products: Subject to compliance with requirements, provide the custom seating indicated, or equal.

2.2 MATERIALS

A. General: All materials, construction and finishing shall be of the highest quality to produce fixed furniture that is equal or superior to the industry standard.

B. Wood Products, General: Provide materials that comply with WIC “Custom” quality standard unless otherwise indicated.

C. Adhesives, General: Do not use adhesives that contain urea formaldehyde.

D. VOC Limits for Installation Adhesives and Glues: Use installation adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.
2. Contact Adhesive: 250 g/L.

2.3 WOOD PRODUCT FABRICATION, GENERAL

A. Wood Product Grade: Unless otherwise indicated, provide WIC Custom grade construction complying with referenced quality standard.

B. Wood Product Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

C. Fabricate wood products to dimensions, profiles, and details indicated.

2.4 UPHOLSTERED SEATING: BOOTHS

A. Frame: 1” upholstery grade hardwood plywood, glued and doweled joints; construction per WIC Custom quality standard.

1. Frame decking: Polypropylene webbing with Dacron cover.
2. Seat, back and arm frames are constructed individually.

B. Seat Back: Tight/monolithic construction; no loose, semi-attached or attached cushions.

1. Seat and arms: 6” 22035CFR hybrid foam base, 1” 18024CFR hybrid foam top layer, ½” 21050CFR hybrid foam front and side layers.
2. Back: 2” 22035CFR hybrid foam base, 1” 18024CFR hybrid foam top and side layers.
3. Hybrid foam: 50% non-petroleum based Polyols, 50% petroleum-based Polyols. Non-petroleum based content shall be derived from a renewable resource such as soy.

C. Fabrication:

1. Seat, back and arms are foamed and upholstered individually.
2. All seams shall be reinforced, utilizing heavy duty, commercial quality thread of fiber compatible with upholstery fiber compositions.
3. All horizontal planes shall be parallel and level for full extent, and at 90 degrees with vertical planes for full extent of all intersections.
4. Foam shall be cut to crown at seams so that a consistent level at all horizontal and vertical planes is maintained upon foam compression with use.

END OF SECTION 123100

SECTION 123661.16 – QUARTZ AND SOLID SURFACING COUNTERTOPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Quartz and Solid surface material countertops.
2. Quartz and Solid surface material backsplashes.
3. Quartz and Solid surface material end splashes.
4. Quartz and Solid surface material apron fronts.

1.3 ACTION SUBMITTALS

A. Product Data: For countertop materials.

B. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.

1. Show locations and details of joints.
2. Show direction of directional pattern, if any.

C. Samples for Initial Selection: For each type of material exposed to view.

D. Samples for Verification: For the following products:

1. Countertop material, 6 inches square.
2. One full-size solid surface material countertop, with front edge, seam and backsplash, 8 by 10 inches, of construction and in configuration specified.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For solid surface material countertops to include in maintenance manuals. Include Product Data for care products used or recommended by Installer and names, addresses, and telephone numbers of local sources for products.

1.6 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate countertops similar to that required for this Project, and whose products have a record of successful in-service performance.

B. Installer Qualifications: Fabricator of countertops.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify dimensions of countertops by field measurements after base cabinets are installed but before countertop fabrication is complete.

1.8 COORDINATION

A. Coordinate locations of utilities that will penetrate countertops or backsplashes.

PART 2 - PRODUCTS

2.1 QUARTZ AGGLOMERATE COUNTERTOP MATERIALS

A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with ICPA SS-1, except for composition.

1. Manufacturer, Colors and Patterns: As indicated on the drawings.

B. Particleboard: ANSI A208.1, Grade M-2, Grade M-2-Exterior Glue at wet conditions.

C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.2 SOLID SURFACE COUNTERTOP MATERIALS

A. Solid Surface Material: Homogeneous-filled plastic resin complying with ICPA - SS-1, SS-2, SS-3.

B. Products: Subject to compliance with requirements of this specification, provide the solid surface products as indicated in the Finish Legend provided on the individual Finish Plans.

1. Solid Surface Countertops manufactured by other manufacturers may be considered, provided deviations in project performance, recycled content, details, dimensions, textures, style, patterns and colors are minor and do not change the design concept as judged by the Architect. The burden of proof is on the proposer

1. Manufacturer, Colors and Patterns: As indicated on the drawings.

C. Plywood: Exterior softwood plywood complying with DOC PS 1, Grade C-C Plugged, touch sanded.

2.3 COUNTERTOP FABRICATION

A. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."

1. Grade: Premium.

B. Configuration:

1. Front: Straight, slightly eased at top.
2. Backsplash: Straight, slightly eased at corner.
3. End Splash: Matching backsplash.

C. Countertops: 3/4-inch- thick, solid surface material with front edge built up with same material.

D. Backsplashes: 1/2-inch- thick, solid surface material.

E. Fabricate tops with shop-applied edges and backsplashes unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.

1. Fabricate with loose backsplashes for field assembly.

F. Joints: Fabricate countertops in sections for joining in field.

1. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.

G. Cutouts and Holes:

1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.

a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.

2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.

2.4 INSTALLATION MATERIALS

A. Adhesive: Product recommended by solid surface material manufacturer.

B. Sealant for Countertops: Comply with applicable requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to receive solid surface material countertops and conditions under which countertops will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of countertops.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.

B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.

D. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.

    1. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned, and joints are of specified width.

F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.

G. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.

H. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

END OF SECTION 066119

PROJECT MANUAL

Including Bid Documents & Contract Documents for Construction of

MID-CONTINENT PUBLIC LIBRARY

WORK PACKAGE 10
COLBERN ROAD BRANCH

1000 NE Colbern Rd, Lee's Summit, MO 64806

PART B

Of Parts A, B, C

MECHANICAL, ELECTRICAL, & PLUMBING

(and related trades)

JE DUNN CONSTRUCTION

SAPP DESIGN + helix. ARCHITECTS

OCHSNER HARE & HARE - OLSSON - TRUE ENGINEERING

December 23, 2019

SDA PROJECT NO. 17-0900

SET NO._____B

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SECTION 21 05 00

COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, fittings, sleeves, escutcheons, seals, and connections for sprinkler systems.

1.02 RELATED REQUIREMENTS

A. Section 21 13 00 - Fire-Suppression Sprinkler Systems: Sprinkler systems design.

1.03 REFERENCE STANDARDS

A. ASME A112.18.1 - Plumbing Supply Fittings; 2012.

B. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing and Fusing Operators; 2017.

C. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; 2015.

D. ASME B16.4 - Gray Iron Threaded Fittings: Classes 125 and 250; 2016.

E. ASTM A536 - Standard Specification for Ductile Iron Castings; 1984 (Reapproved 2014).

F. AWWA C606 - Grooved and Shouldered Joints; 2015.

G. NFPA 13 - Standard for the Installation of Sprinkler Systems; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers catalogue information. Indicate valve data and ratings.

C. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

B. Installer Qualifications: Company specializing in performing work of the type specified this section.
   1. Minimum three years experience.

PART 2 PRODUCTS

2.01 FIRE PROTECTION SYSTEMS

A. Sprinkler Systems: Conform to NFPA 13.

B. Welding Materials and Procedures: Conform to ASME BPVC-IX.

2.02 ABOVE GROUND PIPING

A. Steel Pipe: black.
   1. Steel Fittings:
   2. Cast Iron Fittings: ASME B16.1, flanges and flanged fittings and ASME B16.4, threaded fittings.
   3. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.

2.03 MANUFACTURED SLEEVE-SEAL SYSTEMS

A. Manufacturers:
   1. Advance Products & Systems, Inc: www.apsonline.com.
   2. The Metraflex Company: www.metraflex.com.

B. Modular/Mechanical Seal:
   1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
   2. Provide watertight seal between pipe and wall/casing opening.
   3. Elastomer element size and material in accordance with manufacturer's recommendations.
   4. Glass reinforced plastic pressure end plates.

2.04 ESCUTCHEONS

A. Manufacturers:
   1. Fire Protection Products, Inc: www.fppi.com.com.
   2. Tyco Fire Protection Products: www.tyco-fire.com.
   3. Viking Group Inc: www.vikinggroupinc.com.

B. Material:
   1. Metals and Finish: Comply with ASME A112.18.1.

C. Construction:
   1. One-piece for mounting on chrome-plated tubing, pipe, or one-piece, split-pattern, or type elsewhere.
   2. Internal spring tension devices or setscrews to maintain a fixed position against a surface.

2.05 PIPE HANGERS AND SUPPORTS

A. Hangers for Pipe Sizes 1/2 to 1-1/2 inch (15 to 40 mm): Malleable iron, adjustable swivel, split ring.

B. Hangers for Pipe Sizes 2 inches (50 mm) and Over: Carbon steel, adjustable, clevis.

C. Wall Support for Pipe Sizes to 3 inches (80 mm): Cast iron hook.

D. Wall Support for Pipe Sizes 4 inches (100 mm) and Over: Welded steel bracket and wrought steel clamp.

E. Floor Support: Cast iron adjustable pipe saddle, lock nut, nipple, floor flange, and concrete pier or steel support.

2.06 MECHANICAL COUPLINGS

A. Manufacturers:
   1. Tyco Fire Protection Products; Grinnell G-Fire Figure 705 Grooved Flexible Couplings: www.tyco-fire.com/#sle.
   2. Victaulic Company; FireLock Style 009H: www.victaulic.com.
   3. Viega LLC; MegaPress: www.viega.com.

B. Rigid Mechanical Couplings for Grooved Joints:
   1. Dimensions and Testing: Comply with AWWA C606.
   2. Minimum Working Pressure: 300 psig (2065 kPa).
   3. Housing Material: Fabricate of ductile iron conforming to ASTM A536.
   4. Housing Coating: Factory applied orange enamel.
   5. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F (minus 34 degrees C) to 230 degrees F (110 degrees C).
   6. Bolts and Nuts: Hot dipped galvanized or zinc electroplated steel.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install sprinkler system and service main piping, hangers, and supports in accordance with NFPA 13.

B. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

C. Install piping to conserve building space, to not interfere with use of space and other work.

D. Group piping whenever practical at common elevations.

E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

F. Pipe Hangers and Supports:
   1. Install hangers to provide minimum 1/2 inch (15 mm) space between finished covering and adjacent work.
   2. Place hangers within 12 inches (300 mm) of each horizontal elbow.
   3. Use hangers with 1-1/2 inch (40 mm) minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
   4. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
   5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

G. Slope piping and arrange systems to drain at low points. Use eccentric reducers to maintain top of pipe level.

H. Prepare pipe, fittings, supports, and accessories for finish painting. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.

I. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.

J. Manufactured Sleeve-Seal Systems:
   1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
   2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
   3. Locate piping in center of sleeve or penetration.
   4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
   5. Tighten bolting for a water-tight seal.
   6. Install in accordance with manufacturer's recommendations.

K. Escutcheons:
   1. Install and firmly attach escutcheons at piping penetrations into finished spaces.
   2. Provide escutcheons on both sides of partitions separating finished areas through which piping passes.
   3. Use chrome plated escutcheons in occupied spaces and to conceal openings in construction.

L. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

3.02 CLEANING

A. Upon completion of work, clean all parts of the installation.

B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

END OF SECTION

SECTION 21 13 00

FIRE-SUPPRESSION SPRINKLER SYSTEMS

PART 1 GENERAL

2.01 SECTION INCLUDES

A. Wet-pipe sprinkler system.

B. Deluge sprinkler system.

C. Pre-action sprinkler system.

D. System design, installation, and certification.

E. Fire department connections.

2.02 RELATED REQUIREMENTS

A. Section 21 05 00 - Common Work Results for Fire Suppression: Pipe and fittings.

B. Section 21 05 53 - Identification for Fire Suppression Piping and Equipment.

C. Section 22 05 48 - Vibration and Seismic Controls for Plumbing Piping and Equipment.

D. Section 22 05 53 - Identification for Plumbing Piping and Equipment.

E. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

F. Section 28 46 00 - Fire Detection and Alarm.

2.03 REFERENCE STANDARDS

A. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements 2015.

B. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements 2016.

C. NFPA 13 - Standard for the Installation of Sprinkler Systems Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. NFPA 1963 - Standard for Fire Hose Connections 2014.

E. UL 405 - Fire Department Connection Devices Current Edition; Including All Revisions.

2.04 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meeting: Convene one week before starting work of this section.

2.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on sprinklers, valves, and specialties, including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

C. Shop Drawings:

1. Submit preliminary layout of finished ceiling areas indicating only sprinkler locations coordinated with ceiling installation.

2. Indicate hydraulic calculations, detailed pipe layout, hangers and supports, sprinklers, components and accessories. Indicate system controls.
3. Submit shop drawings and hydraulic calculations to Authorities Having Jurisdiction for approval. Submit proof of approval to Architect.

D. Designer's Qualification Statement.

E. Manufacturer's Qualification Statement.

F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.

1. See Section 01 60 00 - Product Requirements, for additional provisions.
2. Extra Sprinklers: Type and size matching those installed, in quantity required by referenced NFPA design and installation standard.
3. Sprinkler Wrenches: For each sprinkler type.

2.06 QUALITY ASSURANCE

A. Maintain one copy of referenced design and installation standard on site.

B. Comply with FM (AG) requirements.

C. Designer Qualifications: Design system under direct supervision of a Professional Engineer experienced in design of this type of work and licensed in the State in which the Project is located.

D. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

2.07 DELIVERY, STORAGE, AND HANDLING

A. Store products in shipping containers and maintain in place until installation. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

PART 2 PRODUCTS

3.01 MANUFACTURERS

A. Sprinklers, Valves, and Equipment:

1. Tyco Fire Protection Products: www.tyco-fire.com.
2. Viking Corporation: www.vikinggroupinc.com.

3.02 SPRINKLER SYSTEM

A. Sprinkler System: Provide coverage for entire building.

B. Occupancy: Refer to architectural code sheet for occupancy type..

C. Water Supply: Determine volume and pressure from water flow test data.

D. Provide fire department connections where indicated.

E. Storage Cabinet for Spare Sprinklers and Tools: Steel, located adjacent to alarm valve.

F. Pipe Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:

1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.

3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.

3.03 SPRINKLERS

A. Suspended Ceiling Type: Concealed pendant type with matching push on escutcheon plate.
   1. Response Type: Quick.
   2. Coverage Type: Standard.
   3. Escutcheon Plate Finish: Enamel, color as selected.
   4. Fusible Link: Fusible solder link type temperature rated for specific area hazard.
   5. Manufacturers:

B. Exposed Area Type: Pendant type with guard.
   1. Response Type: Quick.
   2. Coverage Type: Standard.
   3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

C. Sidewall Type: Recessed horizontal sidewall type with matching push on escutcheon plate.
   1. Response Type: Quick.
   2. Coverage Type: Standard.
   3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

D. Dry Sprinklers: Concealed pendant type with matching push on escutcheon plate.
   1. Response Type: Quick.
   2. Coverage Type: Standard.
   3. Fusible Link: Fusible solder link type temperature rated for specific area hazard.

E. Guards: Finish to match sprinkler finish.

3.04 PIPING SPECIALTIES

A. Wet Pipe Sprinkler Alarm Valve: Check type valve with divided seat ring, rubber faced clapper to automatically actuate water motor alarm, pressure retard chamber and variable pressure trim with the following additional capabilities and features:
   1. Activate electric alarm.
   2. Test and drain valve.
   3. Replaceable internal components without removing valve from installed position.
   4. Manufacturers:
      a. Victaulic Company; Series 751 with Series 760 motor alarm: www.victaulic.com.

B. Flooding Deluge Valve: Gate type valve with rubber faced disc actuated manually with water motor alarm and electric alarm, with alarm testing trim.

1. Manufacturers:
    a. Vicking model E-1..

C. Preaction Valve:

1. Operated by detection system listed for releasing service and independent of building fire alarm system with provisions for local, manual, and indicated remote releases.
2. Incorporate mechanical latching mechanism incorporating valve clappers independent of system water pressure fluctuations.
3. Provide test detection device for each actuation circuit adjacent to each controlled valve in accordance with NFPA 13.

D. Backflow Preventer: Double check valve assembly backflow preventer with drain and OS & Y gate valve on each end.

E. Test Connections:

1. Inspector's Test Connection for Preaction Systems:
    a. Provide test connections approximately 6 ft (2 m) above floor for each or portion of each sprinkler system equipped with an alarm device, located at the most remote part of each system.
    b. Route test connection to an open-site drain location, excluding janitor sinks, accepting full flow without negative consequences.
    c. Supply discharge orifice with same size as corresponding sprinkler orifice.
    d. Limit vertical height of exterior wall penetration to 2 ft (0.61 m) above finished grade.

F. Electric Alarm: Electrically operated chrome plated gong with pressure alarm switch.

1. Coordinate connection with fire alarm contractor.

G. Water Flow Switch: Vane type switch for mounting horizontal or vertical, with two contacts; rated 10 amp at 125 volt AC and 2.5 amp at 24 volt DC.

1. Coordinate connection with fire alarm contractor.

H. Fire Department Connections:

1. Type: Flush, wall mount made of corrosion resistant metal complying with UL 405.
    a. Inlets: Two way, 2-1/2 inch (65 DN) swivel fittings, internal threaded. Thread size and inlets according to NFPA 1963 or Authority Having Jurisdiction. Brass caps with gaskets, chains, and lugs.
    b. Configuration: Horizontal.

3.05 PREACTION VALVE CONTROL PANEL

A. Manufacturers:

1. Viking VFR400 multi-hazard release control panel..

B. Provide a modular type control panel for electrically operated detection and extinguishing systems for each preaction valve.

1. Factory mount in surface mounted, steel cabinet with hinged doors, and cylinder lock.
2. Provide factory wired assembly containing components and equipment as required to perform specified system operating and supervisory functions.
3. Include isolation switch to allow system testing without activation of the preaction valve.
4. House batteries in separate and lockable, steel cabinet.
5. Finish interior and exterior of cabinet with enamel paint and provide identification plates in accordance with Section 22 05 53.
6. Include trouble lights and trouble alarm.
7. Provide 120 volt AC service transformed through a two-winding, isolation type transformer and rectified to low voltage DC for operation of all system actuating, signal sounding, trouble signal, and fire alarm tripping circuits.
8. Provide UL (DIR) listed as an extinguishing system releasing panel and separate from the building's fire alarm control panel.

C. Secondary Power Supply:

1. Provide nickel cadmium, lead calcium or sealed lead acid rechargeable storage batteries and battery charger.
2. Storage Batteries:
   a. Provide with sufficient ampere-hour rating to operate under supervisory and trouble conditions, including audible trouble signal devices under alarm conditions for an additional 10 minutes and as required in accordance with the equipment listing.
   b. Prevent contact between terminals of adjacent cells, battery terminals, and other metal parts with separate cell construction.
3. Battery Charger:
   a. Provide solid state automatic two rate type, capable of recharging completely discharged batteries to fully charged condition in 24 hours or less.
   b. Locate charger within control panel or battery cabinet.

D. Wiring: Refer to Section 26 05 83.

E. Supervision: Refer to Section 28 46 00.

3.06 AIR COMPRESSOR

A. Compressor: Single unit, electric motor driven, motor, motor starter, safety valves, check valves, air maintenance device incorporating electric pressure switch and unloader valve.

B. Size and selection of air compressor shall be by the fire sprinkler engineer. Coordinate power requirements with electrical contractor..

PART 3 EXECUTION

4.01 INSTALLATION

A. Install in accordance with referenced NFPA design and installation standard.

B. Install equipment in accordance with manufacturer's instructions.

C. Provide approved double check valve assembly at sprinkler system water source connection.

D. Locate fire department connection with sufficient clearance from walls, obstructions, or adjacent Siamese connectors to allow full swing of fire department wrench handle.

E. Locate outside alarm gong on building wall as indicated.

F. Place pipe runs to minimize obstruction to other work.

G. Place piping in concealed spaces above finished ceilings.

H. Center sprinklers in two directions in ceiling tile and provide piping offsets as required.

I. Apply masking tape or paper cover to ensure concealed sprinklers, cover plates, and sprinkler escutcheons do not receive field paint finish. Remove after painting. Replace painted sprinklers.

J. Install air compressor on vibration isolators. Refer to Section 22 05 48.

K. Flush entire piping system of foreign matter.

L. Install guards on sprinklers where indicated.

M. Hydrostatically test entire system.

N. Require test be witnessed by Fire Marshal.

4.02 SCHEDULES

A. Wet-Pipe Sprinkler System:

1. Install in Entry Seating 138, Cafe Storage 103, and Cafe 102 only.

B. Pre-Action Sprinkler System:

1. Install in all areas but the Entry Seating 138, Cafe Storage 103, and Cafe 102.

END OF SECTION

SECTION 22 05 17
SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

1.02 RELATED REQUIREMENTS

A. Section 22 05 23 - General-Duty Valves for Plumbing Piping.

B. Section 22 05 53 - Identification for Plumbing Piping and Equipment: Piping identification.

C. Section 22 07 19 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type) 2016.

B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2013a (Reapproved 2017).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

A. Manufacturers:

1. Flexicraft Industries; Pipe Wall Sleeve

B. Vertical Piping:

1. Sleeve Length: 1 inch (25 mm) above finished floor.
2. Provide sealant for watertight joint.
3. Blocked Out Floor Openings: Provide 1-1/2 inch (40 mm) angle set in silicon adhesive around opening.

C. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.

D. Pipe Passing Through Below Grade Exterior Walls:

1. Zinc coated or cast iron pipe.
2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.

E. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:

1. Galvanized steel pipe or black iron pipe with asphalt coating.
2. Connect sleeve with floor plate except in mechanical rooms.

F. Pipe Passing Through Mechanical, Laundry, and Animal Room Floors above Basement:

1. Galvanized steel pipe or black iron pipe with asphalt coating.
2. Connect sleeve with floor plate except in mechanical rooms.

G. Penetrations in concrete beam flanges are permitted but are prohibited through ribs or beams without prior approval from the Architect.

2.02 **MANUFACTURED SLEEVE-SEAL SYSTEMS**

A. Manufacturers:

1. Advance Products & Systems, LLC; Innerlynx
2. Flexicraft Industries; PipeSeal

B. Modular/Mechanical Seal:

1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
2. Provide watertight seal between pipe and wall/casing opening.
3. Elastomer element size and material in accordance with manufacturer's recommendations.
4. Glass reinforced plastic pressure end plates.

PART 3 EXECUTION

3.01 **PREPARATION**

A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.

3.02 **INSTALLATION**

A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.

B. Install piping to conserve building space, to not interfere with use of space and other work.

C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

D. Provide sleeves when penetrating footings, floors, walls and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.

1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
2. Aboveground Piping:
   a. Pack solid using mineral fiber complying with ASTM C592.
   b. Fill space with an elastomer caulk to a depth of 0.50 inch (15 mm) where penetrations occur between conditioned and unconditioned spaces.

E. Manufactured Sleeve-Seal Systems:

1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.

2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
3. Locate piping in center of sleeve or penetration.
4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
5. Tighten bolting for a water-tight seal.
6. Install in accordance with manufacturer's recommendations.

F. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

END OF SECTION

SECTION 22 05 23

GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Applications.

B. General requirements.

C. Angle valves.

D. Ball valves.

1.02 RELATED REQUIREMENTS

A. Section 22 05 53 - Identification for Plumbing Piping and Equipment.

B. Section 22 10 05 - Plumbing Piping.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. See drawings for specific valve locations.

B. Provide the following valves for the applications if not indicated on drawings:
   1. Shutoff: Ball.

C. Required Valve End Connections for Non-Wafer Types:
   1. Copper Tube:
      a. 2 NPS (50 DN) and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.
      b. 2-1/2 NPS (65 DN) to 4 NPS (100 DN): Grooved or flanged ends except where threaded valve-end option is indicated in valve schedules below.

D. Domestic, Hot and Cold Water Valves:
   1. 2 NPS (50 DN) and Smaller:
      a. Bronze and Brass: Provide with solder-joint or threaded ends.
      b. Bronze Angle: Class 125, bronze disc.
      c. Ball: One piece, full port, bronze with brass trim.
   2. 2-1/2 NPS (65 DN) and Larger:
      a. Iron, 2-1/2 NPS (65 DN) to 4 NPS (100 DN): Provide with threaded or flanged ends.
      b. Iron Ball: Class 150.

2.02 GENERAL REQUIREMENTS

A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.

B. Valve Sizes: Match upstream piping unless otherwise indicated.

C. Valve-End Connections:
   1. Threaded End Valves: ASME B1.20.1.
   2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
   3. Solder Joint Connections: ASME B16.18.

D. General ASME Compliance:

1. Solder-joint Connections: ASME B16.18.

2.03 BRONZE ANGLE VALVES

A. Class 125: CWP Rating: 200 psig: (1380 kPa).
   1. Comply with MSS SP-80, Type 1.
   2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
   3. Ends: Threaded.
   4. Stem: Bronze.
   5. Disc: Bronze.
   6. Packing: Asbestos free.
   7. Handwheel: Bronze or aluminum.

2.04 BRONZE BALL VALVES

A. Two Piece, Full Port with Bronze Trim:
   1. Comply with MSS SP-110.
   2. SWP Rating: 150 psig (1035 kPa).
   3. CWP Rating: 600 psig (4140 kPa).
   4. Body: Bronze.
   5. Ends: Threaded.
   6. Seats: PTFE.
   7. Stem: Bronze.
   8. Ball: Chrome plated brass.
   9. Manufacturers:
      a. Viega LLC;
      b. Nibco.
      c. Substitutions: See Section 01 60 00 - Product Requirements.

2.05 IRON BALL VALVES

A. Class 125, Full Port, Stainless Steel Trim:
   1. Comply with MSS SP-72.
   2. CWP Rating: 200 psig (1380 kPa).
   3. Body: ASTM A536, Grade 65-45-12, ductile iron.
   4. Ends: Flanged.
   5. Seats: PTFE.
   6. Stem: Stainless steel.
   7. Ball: Stainless steel.
   8. Operator: Lever, with locking handle.
   9. Manufacturers:
      a. Nibco.
      b. Viega
      c. Substitutions: See Section 01 60 00 - Product Requirements.

PART 3 EXECUTION

3.01 INSTALLATION

A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.

B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.

END OF SECTION

SECTION 22 05 29

HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, piping, and other plumbing work.

1.02 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

1.03 ADMINISTRATIVE REQUIREMENTS

A. Coordination:
   1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
   2. Coordinate the work with other trades to provide additional framing and materials required for installation.
   3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
   4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
   5. Notify Architect of any conflicts with or deviations from the contract documents. Obtain direction before proceeding with work.

B. Sequencing:
   1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 03 30 00.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, non-penetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.

b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Metal Channel (Strut) Framing Systems:
1. Manufacturers:
a. Cooper B-Line, a division of Eaton Corporation; www.cooperindustries.com
b. Thomas & Betts Corporation; www.tnb.com.
c. Unistrut, a brand of Atkore International Inc; www.unistrut.com.
2. Comply with MFMA-4.
3. Channel Material:
a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
4. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch (2.66 mm).
5. Minimum Channel Dimensions: 1-5/8 inch (41 mm) width by 13/16 inch (21 mm) height.

C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
a. Equipment Supports: 1/2 inch (13 mm) diameter.
b. Piping up to 1 inch (27 mm) nominal: 1/4 inch (6 mm) diameter.
c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch (10 mm) diameter.

D. Non-Penetrating Rooftop Supports for Low-Slope Roofs:
1. Manufacturers:
a. Cooper B-Line, a division of Eaton Corporation; www.cooperindustries.com.
b. Erico International Corporation, a brand of Pentair; www.erico.com.
2. Provide steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
3. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
4. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
5. Mounting Height: Provide minimum clearance of 6 inches (150 mm) under supported component to top of roofing.

E. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

F. Equipment Support and Attachment:
1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.

2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

G. Secure fasteners according to manufacturer's recommended torque settings.

H. Remove temporary supports.

END OF SECTION

SECTION 22 05 53

IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Pipe markers.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.

C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Water Heater: Nameplates.

B. Piping: Pipe markers.

C. Pumps: Nameplates.

2.02 NAMEPLATES

A. Manufacturers:
   1. Brimar Industries, Inc; www.pipemarker.com.
   2. Kolbi Pipe Marker Co; www.kolbipipemarkers.com.
   3. Seton Identification Products; www.seton.com.

B. Description: Laminated three-layer plastic with engraved letters.
   1. Letter Color: White.
   2. Letter Height: 1/4 inch (6 mm).
   3. Background Color: Black.
   4. Plastic: Conform to ASTM D709.

2.03 PIPE MARKERS

A. Manufacturers:
   1. Brady Corporation; www.bradycorp.com.
   2. Brimar Industries, Inc; www.pipemarker.com.
   3. Kolbi Pipe Marker Co; www.kolbipipemarkers.com.
   4. MIFAB, Inc; www.mifab.com.
   5. Seton Identification Products; www.seton.com.

B. Comply with ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

E. Color code as follows:

1. Potable, Roof Drain, Other Water: Green with white letters.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plastic nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install plastic pipe markers in accordance with manufacturer's instructions.

END OF SECTION

SECTION 22 07 19

PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 09 91 23 - Interior Painting: Painting insulation jacket.

C. Section 22 10 05 - Plumbing Piping: Placement of hangers and hanger inserts.

1.03 REFERENCE STANDARDS

A. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2016.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

C. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 CLOSED CELL FLEXIBLE ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:
   1. Aeroflex USA, Inc; www.aeroflexusa.com.
   2. Armacell LLC; AP Armaflex: www.armacell.us.
   3. K-Flex USA LLC; Insul-Tube: www.kflexusa.com.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F (Minus 40 degrees C).
   2. Maximum Service Temperature: 220 degrees F (104 degrees C).
   3. Connection: Waterproof vapor barrier adhesive.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that piping has been tested before applying insulation materials.

B. Verify that surfaces are clean and dry, with foreign material removed.

3.02 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Exposed Piping: Locate insulation and cover seams in least visible locations.

C. For hot piping conveying fluids 140 degrees F (60 degrees C) or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.

D. Inserts and Shields:
   1. Application: Piping 1-1/2 inches (40 mm) diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert Location: Between support shield and piping and under the finish jacket.
   4. Insert Configuration: Minimum 6 inches (150 mm) long, of same thickness and contour as adjoining insulation; may be factory fabricated.

E. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 84 00.

F. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet (3 meters) above finished floor): Finish with canvas jacket sized for finish painting.

3.03 SCHEDULES

A. Plumbing Systems:
   1. Domestic Hot Water Supply: 1" Thick Closed Cell Flexible Elastomeric
   2. Domestic Hot Water Recirculation: 1" Thick Closed Cell Flexible Elastomeric
   3. Tempered Domestic Water Supply: 1" Thick Closed Cell Flexible Elastomeric
   4. Roof Drainage Above Grade: 1" Thick Closed Cell Flexible Elastomeric
   5. Condensate inside building: 1" Thick Closed Cell Flexible Elastomeric

END OF SECTION

SECTION 22 10 05

PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, specialties, and connections for piping systems.
   1. Sanitary sewer.
   2. Domestic water.
   3. Storm water.
   4. Natural Gas Piping.
   5. Condensate Piping.
   6. Pipe hangers and supports.

1.02 RELATED REQUIREMENTS

A. Section 22 05 16 - Expansion Fittings and Loops for Plumbing Piping.

B. Section 22 05 53 - Identification for Plumbing Piping and Equipment.

C. Section 22 07 19 - Plumbing Piping Insulation.

1.03 REFERENCE STANDARDS

A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300; 2016.

B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; 2012.

C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.

D. ASME B31.1 - Power Piping; 2016.

E. ASME B31.9 - Building Services Piping; 2014.

F. ASSE 1003 - Performance Requirements for Water Pressure Reducing Valves for Domestic Water Distribution Systems; 2009.

G. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2018.

H. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

I. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service; 2017.

J. ASTM B32 - Standard Specification for Solder Metal; 2008 (Reapproved 2014).

K. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016.

L. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2016.

M. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube; 2016.

N. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings; 2016.

O. ASTM D1785 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120; 2015, with Editorial Revision (2018).

P. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series); 2015.

Q. ASTM D2466 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40; 2017.

R. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems; 2012.

S. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings; 2014.

T. ASTM D2855 - Standard Practice for the Two-Step (Primer & Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets; 2015.

U. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings; 2016.

V. AWWA C550 - Protective Interior Coatings for Valves and Hydrants; 2017.

W. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe, 4 In. Through 12 In. (100 mm Through 300 mm), for Water Transmission and Distribution; 2016.

X. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.

Y. NSF 61 - Drinking Water System Components - Health Effects; 2017.

Z. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING

A. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 SANITARY SEWER / VENT PIPING, ABOVE GRADE

A. PVC Pipe: ASTM D1785 Schedule 40, or ASTM D2241 SDR 26 with not less than 150 psi (1 034 kPa) pressure rating.
   1. Fittings: ASTM D2466, PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.04 DOMESTIC WATER PIPING, BURIED BEYOND 5 FEET (1500 MM) OF BUILDING

A. PVC Pipe: AWWA C900.

2.05 DOMESTIC WATER PIPING, ABOVE GRADE

A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
   2. Joints: ASTM B32, alloy Sn95 solder.

2.06 STORM WATER PIPING, BURIED WITHIN 5 FEET (1500 MM) OF BUILDING

A. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.07 STORM WATER PIPING, ABOVE GRADE

A. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.08 NATURAL GAS PIPING, ABOVE GRADE

A. Steel Pipe: ASTM A53/A53M Schedule 40 black.
   1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
   2. Joints: Threaded or welded to ASME B31.1.

2.09 CONDENSATE PIPING

A. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.10 PIPE HANGERS AND SUPPORTS

A. Provide hangers and supports that comply with MSS SP-58.
   1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
   2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.
   4. Vertical Pipe Support: Steel riser clamp.
   5. Rooftop Supports for Low-Slope Roofs: Steel pedestals with bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified; and as follows:
      a. Bases: High density polypropylene.
      b. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
      c. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
      d. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion resistant material.
      e. Height: Provide minimum clearance of 6 inches (150 mm) under pipe to top of roofing.

B. Plumbing Piping - Drain, Waste, and Vent:
   1. Hangers for Pipe Sizes 1/2 Inch (15 mm) to 1-1/2 Inches (40 mm): Malleable iron, adjustable swivel, split ring.
   2. Hangers for Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.

C. Plumbing Piping - Water:
   1. Hangers for Pipe Sizes 1/2 Inch (15 mm) to 1-1/2 Inches (40 mm): Malleable iron, adjustable swivel, split ring.
   2. Hangers for Cold Pipe Sizes 2 Inches (50 mm) and Over: Carbon steel, adjustable, clevis.
   3. Hangers for Hot Pipe Sizes 2 Inches (50 mm) to 4 Inches (100 mm): Carbon steel, adjustable, clevis.

2.11 WATER PRESSURE REDUCING VALVES

A. Manufacturers:
   1. Amtrol Inc; www.amtrol.com.
   2. Cla-Val Company; www.cla-val.com.
   3. Flomatic Valves; www.flomatic.com.
   4. Watts Regulator Company; www.wattsregulator.com.

B. Up to 2 Inches (50 mm):

1. ASSE 1003, bronze body, stainless steel, and thermoplastic internal parts, fabric reinforced diaphragm, strainer, threaded single union ends.

C. Over 2 Inches (50 mm):
1. ASSE 1003, cast iron body with interior lining complying with AWWA C550, bronze fitted, elastomeric diaphragm and seat disc, flanged.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.

C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.

D. Install piping to maintain headroom, conserve space, and not interfere with use of space.

E. Group piping whenever practical at common elevations.

F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 22 05 16.

G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.

H. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

I. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

J. Pipe Hangers and Supports:
1. Install in accordance with ASME B31.9.
2. Support horizontal piping as indicated.
3. Install hangers to provide minimum 1/2 inch (15 mm) space between finished covering and adjacent work.
4. Place hangers within 12 inches (300 mm) of each horizontal elbow.
5. Use hangers with 1-1/2 inch (40 mm) minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.

3.02 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, verify system is complete, flushed and clean.

3.03 SERVICE CONNECTIONS

A. Provide new sanitary sewer services. Before commencing work check invert elevations required for sewer connections, confirm inverts and ensure that these can be properly connected with slope for drainage and cover to avoid freezing.

B. Provide new water service complete with approved reduced pressure backflow preventer and water meter with by-pass valves, pressure reducing valve, and sand strainer.

3.04 SCHEDULES

A. Pipe Hanger Spacing:
1. Metal Piping:
a. Pipe Size: 1/2 inches (15 mm) to 1-1/4 inches (32 mm):
1) Maximum Hanger Spacing: 6.5 ft (2 m).
2) Hanger Rod Diameter: 3/8 inches (9 mm).
b. Pipe Size: 1-1/2 inches (40 mm) to 2 inches (50 mm):
1) Maximum Hanger Spacing: 10 ft (3 m).
2) Hanger Rod Diameter: 3/8 inch (9 mm).

c. Pipe Size: 2-1/2 inches (65 mm) to 3 inches (75 mm):
   1) Maximum Hanger Spacing: 10 ft (3 m).
   2) Hanger Rod Diameter: 1/2 inch (13 mm).

2. Plastic Piping:
   a. All Sizes:
      1) Maximum Hanger Spacing: 6 ft (1.8 m).
      2) Hanger Rod Diameter: 3/8 inch (9 mm).

END OF SECTION

SECTION 22 30 00

PLUMBING EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water Heaters:
   1. Commercial gas fired.

B. In-line circulator pumps.

1.02 REFERENCE STANDARDS

A. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittals procedures.

B. Product Data:
   1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
   2. Indicate pump type, capacity, power requirements.

PART 2 PRODUCTS

2.01 WATER HEATERS

A. Manufacturers:
   1. A.O. Smith Water Products Co; www.hotwater.com.
   2. Bradford White.

B. Commercial Gas Fired:
   1. Type: Automatic, natural gas-fired, vertical storage.
   2. Performance: Refer to Water Heater Schedule.
   3. Tank: Glass lined welded steel ASME labeled; multiple flue passages, 4 inch (100 mm) diameter inspection port, thermally insulated with minimum 2 inches (50 mm) glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
   4. Accessories:
      a. Water Connections: Brass.
      b. Dip Tube: Brass.
      c. Drain valve.
      d. Anode: Magnesium.
      e. Temperature and Pressure Relief Valve: ASME labeled.
   5. Certified For The Following Applications:
      a. Automatic storage water heater.
   6. Controls: Automatic direct immersion thermostat with temperature range adjustable minimum 175 degrees F (97 degrees C) differential, automatic reset high temperature limiting thermostat factory set at 195 degrees F (90 degrees C), gas pressure regulator, multi-ribbon or tubular burner, 100 percent safety shut-off pilot and thermocouple, intermittent electronic ignition monitoring pilot and main flame, trial for re-ignition for momentary loss of flame, shutdown of pilot and main burner in "2 to 4" seconds after loss of flame, and automatic flue damper.

2.02 IN-LINE CIRCULATOR PUMPS

A. Manufacturers:
   1. Armstrong Fluid Technology; www.armstrongfluidtechnology.com.
   2. Bell & Gossett, a xylem brand; www.bellgossett.com.

3. Taco.

B. Casing: Bronze, rated for 125 psig (860 kPa) working pressure, with stainless steel rotor assembly.

C. Impeller: Bronze.

D. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.

E. Seal: Carbon rotating against a stationary ceramic seat.

F. Drive: Flexible coupling.

G. Performance: Refer to pump schedule

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.

B. Coordinate with plumbing piping and related gas venting and electrical work to achieve operating system.

C. Pumps:

1. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

END OF SECTION

SECTION 22 40 00

PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water closets.

B. Urinals.

C. Lavatories.

D. Sinks.

E. Service sinks.

F. Under-lavatory pipe supply covers.

G. Electric water coolers.

1.02 RELATED REQUIREMENTS

A. Section 22 10 05 - Plumbing Piping.

B. Section 22 30 00 - Plumbing Equipment.

1.03 REFERENCE STANDARDS

A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

B. ASME A112.18.9 - Protectors/Insulators for Exposed Waste and Supplies on Accessible Fixtures; 2011.

C. ASTM C1822 - Standard Specification for Insulating Covers on Accessible Lavatory Piping; 2015.

D. ASME A112.6.1M - Supports for Off-the-Floor Plumbing Fixtures for Public Use; 1997 (Reaffirmed 2017).

E. ASME A112.18.1 - Plumbing Supply Fittings; 2012.

F. ASME A112.19.2 - Ceramic Plumbing Fixtures; 2013.

G. ASME A112.19.3 - Stainless Steel Plumbing Fixtures; 2017.

H. ASME A112.19.5 - Flush Valves and Spuds for Water Closets, Urinals, and Tanks; 2017.

I. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

J. NSF 61 - Drinking Water System Components - Health Effects; 2017.

K. NSF 372 - Drinking Water System Components - Lead Content; 2016.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

PART 2 PRODUCTS

2.01 GENERAL

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

2.02 FLUSH VALVE WATER CLOSETS

A. Water Closets: Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china bolt caps.
   1. Flush Valve: Exposed (top spud).
   2. Flush Operation: Sensor operated.
   3. Handle Height: 44 inches (1117 mm) or less.

B. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.

1. Sensor-Operated Type: Solenoid or motor-driven operator, battery powered, infrared sensor with mechanical over-ride or over-ride push button.
2. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.

C. Seats:
1. Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, with cover.

2.03 WALL HUNG URINALS

A. Urinals: Vitreous china, ASME A112.19.2, wall hung with side shields and concealed carrier.
1. Flush Volume: 1.0 gallons (3.7 liters), maximum.
2. Flush Valve: Exposed (top spud).
3. Flush Operation: Sensor operated.
4. Trap: Integral.

B. Flush Valves: ASME A112.18.1, diaphragm type, complete with vacuum breaker stops and accessories.
1. Sensor-Operated Type: Solenoind or motor-driven operator, battery powered, infrared sensor with mechanical over-ride or over-ride push button.
2. Exposed Type: Chrome plated, escutcheon, integral screwdriver stop.

C. Carriers:
1. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded fixture studs for fixture hanger, bearing studs.

2.04 LAVATORIES

A. Vitreous China Wall Hung Basin: ASME A112.19.2; vitreous china wall hung lavatory, _____ minimum, with 4 inch (100 mm) high back, rectangular basin with splash lip, front overflow, and soap depression.

B. Sensor Operated Faucet: Cast brass, chrome plated, wall mounted with sensor located on neck of spout.
1. Spout Style: Standard.
2. Power Supply: Per manufacturer's requirements.
a. Cord and plug.
3. Mixing Valve: None, single line for tempered water.
4. Water Supply: 3/8 inch (9 mm) compression connections.
5. Finish: Polished chrome.

C. Accessories:
1. Chrome plated 17 gage, 0.0538 inch (1.37 mm) brass P-trap with clean-out plug and arm with escutcheon.
2. Offset waste with perforated open strainer.
3. Carrier:
a. ASME A112.6.1M; cast iron and steel frame with tubular legs, lugs for floor and wall attachment, threaded studs for fixture hanger, bearing plate and studs.

2.05 SINKS

A. Single Compartment Bowl: 20 gage, 0.0359 inch (0.91 mm) thick, Type 302 stainless steel, self rimming and undercoated, with ledge back drilled for trim.
1. Drain: 1-1/2 inch (38 mm) chromed brass drain.
2. Drain: 3-1/2 inch (90 mm) crumb cup and tailpiece.

B. Double Compartment Bowl: 20 gage, 0.0359 inch (0.91 mm) thick, Type 302 stainless steel, self rimming and undercoated, with ledge back drilled for trim.
1. Drain: 1-1/2 inch (38 mm) chromed brass drain.
2. Drain: 3-1/2 inch (90 mm) crumb cup and tailpiece.

2.06 UNDER-LAVATORY PIPE SUPPLY COVERS

A. Basis of Design: Plumberex Specialty Products, Inc; www.plumberex.com.
   1. Fusion Molded Under-Lavatory Insulators (Non-Sewn): Plumberex Handy-Shield Maxx.
   2. Slim Fit Under-Lavatory Insulators (Non-Sewn): Plumberex Trap Gear.
   3. Under-Lavatory Covers with Snap-Lock Fasteners (Molded): Plumberex Pro-Extreme.

B. General:
   1. Insulate exposed drainage piping including hot, cold and tempered water supplies under lavatories or sinks per ADA Standards.
   2. Construction: 1/8 inch (3.2 mm) PVC with antimicrobial, antifungal and UV resistant properties.
      a. Comply with ASTM C1822 Type III for covers on accessible lavatory piping.
      b. Comply with ASME A112.18.9 for covers on accessible lavatory piping.
      c. Comply with ICC A117.1.
   3. Fasteners: Reusable, snap-locking fasteners with no sharp or abrasive external surfaces. No cable ties allowed.

2.07 ELECTRIC WATER COOLERS

A. Water Cooler: Electric, mechanically refrigerated; surface handicapped mounted; stainless steel top, vinyl on steel body, elevated anti-squirt bubbler with stream guard, automatic stream regulator, push button, mounting bracket; integral air cooled condenser and stainless steel grille.

2.08 SERVICE SINKS

A. Bowl: 24 by 24 by 10 inch (600 by 600 by 250 mm) high white molded stone, floor mounted, with one inch (25 mm) wide shoulders, vinyl bumper guard, stainless steel strainer.

B. Trim: ASME A112.18.1 exposed wall type supply with cross handles, spout wall brace, vacuum breaker, hose end spout, strainers, eccentric adjustable inlets, integral screwdriver stops with covering caps and adjustable threaded wall flanges.

C. Accessories:
   1. Hose clamp hanger.
   2. Mop hanger.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install components level and plumb.

B. Install and secure fixtures in place with wall supports and bolts.

3.02 INTERFACE WITH WORK OF OTHER SECTIONS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.03 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.04 CLEANING

A. Clean plumbing fixtures and equipment.

3.05 SCHEDULES

A. Refer to Plumbing Fixture Schedule.

END OF SECTION

SECTION 23 05 29

HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, piping, and other HVAC/hydronic work.

1.02 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

F. MFMA-4 - Metal Framing Standards Publication; 2004.

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
      c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
   1. Manufacturers:
      a. Cooper B-Line, a division of Eaton Corporation; www.cooperindustries.com.
      b. Thomas & Betts Corporation; www.tnb.com.
      c. Unistrut, a brand of Atkore International Inc; www.unistrut.com.
   2. Comply with MFMA-4.
   3. Channel Material:
      a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
      b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.

4. Minimum Channel Thickness: Steel sheet, 12 gage, 0.1046 inch (2.66 mm).
5. Minimum Channel Dimensions: 1-5/8 inch (41 mm) width by 13/16 inch (21 mm) height.

C. Thermal Insulated Pipe Supports:
1. General Construction and Requirements:
a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
c. Pipe supports to be provided for nominally sized, 1/2 inch to 30 inch (12.7 mm to 762 mm) iron pipes.
d. Insulation inserts to consist of polyisocyanurate (urethane) insulation surrounded by a 360 degree, PVC jacketing.
2. PVC Jacket:
a. Pipe insulation protection shields to be provided with a ball bearing hinge and locking seam.
b. Moisture Vapor Transmission: 0.0071 perm inch (0.0092 ng/Pa s m), when tested in accordance with ASTM E96/E96M.
c. Thickness: 60 mil (1.524 mm).
3. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation as indicated on drawings.

D. Anchors and Fasteners:
1. Manufacturers - Mechanical Anchors:
a. Hilti, Inc; www.us.hilti.com.
b. ITW Red Head, a division of Illinois Tool Works, Inc; www.itwredhead.com.
c. Simpson Strong-Tie Company Inc; www.strongtie.com.
2. Manufacturers - Powder-Actuated Fastening Systems:
a. Hilti, Inc; www.us.hilti.com.
b. ITW Ramset, a division of Illinois Tool Works, Inc; www.ramset.com.
c. Simpson Strong-Tie Company Inc; www.strongtie.com.
3. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

F. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.

G. Equipment Support and Attachment:
1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.

3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Secure fasteners according to manufacturer's recommended torque settings.

I. Remove temporary supports.

END OF SECTION

SECTION 23 05 53

IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe markers.

D. Ceiling tacks.

1.02 RELATED REQUIREMENTS

A. Section 09 91 23 - Interior Painting: Identification painting.

1.03 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems; 2015.

B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials; 2017.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. DOAU: Nameplates.

B. Piping: Pipe markers.

C. Fan Coil Units: Tags.

D. Filters in Fan Coil Units: Ceiling tacks.

2.02 NAMEPLATES

A. Manufacturers:
   1. Advanced Graphic Engraving, LLC; www.advancedgraphicengraving.com.
   2. Brimar Industries, Inc; www.pipemarker.com.
   3. Kolbi Pipe Marker Co; www.kolbipipemarkers.com.
   4. Seton Identification Products, a Tricor Direct Company; www.seton.com.

B. Letter Color: White.

C. Letter Height: 1/4 inch (6 mm).

D. Background Color: Black.

E. Plastic: Conform to ASTM D709.

2.03 TAGS

A. Manufacturers:
   1. Advanced Graphic Engraving; www.advancedgraphicengraving.com.
   2. Brady Corporation; www.bradycorp.com.
   3. Brimar Industries, Inc; www.pipemarker.com.
   4. Kolbi Pipe Marker Co; www.kolbipipemarkers.com.
   5. Seton Identification Products, a Tricor Company; www.seton.com.

B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch (40 mm) diameter.

2.04 PIPE MARKERS

A. Manufacturers:
   1. Brady Corporation; www.bradycorp.com.
   2. Brimar Industries, Inc; www.pipemarker.com.
   3. Kolbi Pipe Marker Co; www.kolbipipemarkers.com.
   4. MIFAB, Inc; www.mifab.com.
   5. Seton Identification Products, a Tricor Company; www.seton.com.

B. Color: Conform to ASME A13.1.

C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.

D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

2.05 CEILING TACKS

A. Description: Steel with 3/4 inch (20 mm) diameter color coded head.

B. Color code as follows:
   1. Filters: Yellow.

PART 3 EXECUTION

3.01 PREPARATION

A. Degrease and clean surfaces to receive adhesive for identification materials.

B. Prepare surfaces in accordance with Section 09 91 23 for stencil painting.

3.02 INSTALLATION

A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

B. Install tags with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.

C. Install plastic pipe markers in accordance with manufacturer's instructions.

D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

END OF SECTION

SECTION 23 05 93

TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Testing, adjustment, and balancing of air systems.

1.02 REFERENCE STANDARDS

A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition; 2016.

B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems; 2008.

C. NEBB (TAB) - Procedural Standards for Testing Adjusting and Balancing of Environmental Systems; 2015, with Errata (2017).

D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing; 2002.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.

C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
   1. Submit to Architect.
   2. Include at least the following in the plan:
      a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
      b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
      c. Discussion of what notations and markings will be made on the duct and piping drawings during the process.
      d. Final test report forms to be used.
      e. Detailed step-by-step procedures for TAB work for each system and issue, including:
         1) Terminal flow calibration (for each terminal type).
         2) Diffuser proportioning.
         3) Branch/submain proportioning.
         4) Total flow calculations.
         5) Rechecking.
         6) Diversity issues.
      f. Expected problems and solutions, etc.
      g. Details of how TOTAL flow will be determined; for example:
         1) Air: Sum of terminal flows via control system calibrated readings or via hood readings of all terminals, supply (SA) and return air (RA) pitot traverse, SA or RA flow stations.
      h. Procedures for formal deficiency reports, including scope, frequency and distribution.

D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
   1. Revise TAB plan to reflect actual procedures and submit as part of final report.
   2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect and for inclusion in operating and maintenance manuals.
   3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
   4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.

5. Units of Measure: Report data in I-P (inch-pound) units only.
6. Include the following on the title page of each report:
    a. Name of Testing, Adjusting, and Balancing Agency.
    b. Address of Testing, Adjusting, and Balancing Agency.
    c. Telephone number of Testing, Adjusting, and Balancing Agency.
    d. Project name.
    e. Project location.
    f. Project Engineer.
    g. Project Contractor.
    h. Project altitude.
    i. Report date.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

A. Perform total system balance in accordance with one of the following:
    1. AABC (NSTSB), AABC National Standards for Total System Balance.
    2. SMACNA (TAB).
    3. Maintain at least one copy of the standard to be used at project site at all times.

B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.

C. TAB Agency Qualifications:
    1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
    2. Having minimum of three years documented experience.
    3. Certified by one of the following:
        a. AABC, Associated Air Balance Council: www.aabc.com/#sle; upon completion submit AABC National Performance Guaranty.
        b. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: www.tabbcertified.org/#sle.

D. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

3.02 EXAMINATION

A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
    1. Systems are started and operating in a safe and normal condition.
    2. Temperature control systems are installed complete and operable.
    3. Proper thermal overload protection is in place for electrical equipment.
    4. Final filters are clean and in place. If required, install temporary media in addition to final filters.
    5. Duct systems are clean of debris.
    6. Fans are rotating correctly.
    7. Air coil fins are cleaned and combed.
    8. Duct system leakage is minimized.

B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.

3.03 PREPARATION

A. Hold a pre-balancing meeting at least one week prior to starting TAB work.
    1. Require attendance by all installers whose work will be tested, adjusted, or balanced.

B. Provide instruments required for testing, adjusting, and balancing operations. Make instruments available to Architect to facilitate spot checks during testing.

3.04 ADJUSTMENT TOLERANCES

A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.

B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.

3.05 AIR SYSTEM PROCEDURE

A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities at site altitude.

B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.

C. Measure air quantities at air inlets and outlets.

D. Adjust distribution system to obtain uniform space temperatures free from objectionable drafts and noise.

E. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.

F. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.

G. Provide system schematic with required and actual air quantities recorded at each outlet or inlet.

3.06 SCOPE

A. Test, adjust, and balance the following:
   1. Air Inlets and Outlets.
   2. DOAU
   3. VRF Fan Coil Units

3.07 MINIMUM DATA TO BE REPORTED

A. Air Moving Equipment (Air Devices, Fan Coil Units, and DOAU)
   1. Location.
   2. Manufacturer.
   3. Model number.
   4. Serial number.
   5. Arrangement/Class/Discharge.
   6. Air flow, specified and actual.
   7. Return air flow, specified and actual.
   8. Outside air flow, specified and actual.
   9. Total static pressure (total external), specified and actual.
   10. Inlet pressure.
   11. Discharge pressure.
   12. Sheave Make/Size/Bore.
   13. Number of Belts/Make/Size.
   14. Fan RPM.

END OF SECTION

SECTION 23 07 13

DUCT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Duct insulation.

B. Duct liner.

1.02 REFERENCE STANDARDS

A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus; 2017.

B. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013.

C. ASTM C1071 - Standard Specification for Fibrous Glass Duct Lining Insulation (Thermal and Sound Absorbing Material); 2016.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.

F. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.

G. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).

H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 GLASS FIBER, FLEXIBLE

A. Manufacturer:
   1. Johns Manville; www.jm.com.
   2. Knauf Insulation; Atmosphere Duct Wrap: www.knaufinsulation.com.
   3. Owens Corning Corporation; www.ocbuildingspec.com.
   4. CertainTeed Corporation; www.certainteed.com.

B. Insulation: ASTM C553; flexible, noncombustible blanket.
   1. 'K' ('Ksi') value: 0.36 at 75 degrees F (0.052 at 24 degrees C), when tested in accordance with ASTM C518.
   2. Maximum Service Temperature: 250 degrees F (121 degrees C).
   3. Maximum Water Vapor Absorption: 5.0 percent by weight.

C. Vapor Barrier Jacket:
   1. Kraft paper with glass fiber yarn and bonded to aluminized film.
   2. Moisture Vapor Permeability: 0.02 perm inch (0.029 ng/Pa s m), when tested in accordance with ASTM E96/E96M.

3. Secure with pressure sensitive tape.

D. Vapor Barrier Tape:
   1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film, with pressure sensitive rubber based adhesive.

2.03 DUCT LINER

A. Manufacturers:
   1. Armacell LLC; AP Coilflex: www.armacell.us.
   2. Johns Manville; www.jm.com.
   3. Knauf Insulation; www.knaufinsulation.com.

B. Glass Fiber Insulation: Non-corrosive, incombustible glass fiber complying with ASTM C1071; flexible blanket; impregnated surface and edges coated with poly vinyl acetate polymer, acrylic polymer, or black composite.
   1. Fungal Resistance: No growth when tested according to ASTM G21.
   2. Apparent Thermal Conductivity: Maximum of 0.31 at 75 degrees F (0.045 at 24 degrees C).
   3. Service Temperature: Up to 250 degrees F (121 degrees C).
   4. Rated Velocity on Coated Air Side for Air Erosion: 5,000 fpm (25.4 m/s), minimum.
   5. Minimum Noise Reduction Coefficients:
      a. 1/2 inch (13 mm) Thickness: 0.30.
      b. 1 inch (25 mm) Thickness: 0.45.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

3.02 SCHEDULES

A. Dedicated Outside Air Unit:
   1. Round supply and exhaust ductwork in non-exposed ceiling areas: 1.5" Glass Fiber Wrap
   2. Rectangular supply and exhaust ductwork: 1" Lined Ductwork
   3. Oval supply and exhaust ductwork: Double wall with 1” internal insulated ductwork.

B. Fan Coil Units:
   1. Round supply and return ductwork: 1.5" Glass Fiber Wrap
   2. Rectangular supply and return ductwork: 1" Lined Ductwork
   3. Oval supply and return ductwork: Double wall with 1” internal insulated ductwork

END OF SECTION

SECTION 23 07 19

HVAC PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 23 23 00 - Refrigerant Piping: Placement of inserts.

1.03 REFERENCE STANDARDS

A. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form; 2016.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2018.

C. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

PART 2 PRODUCTS

2.01 REGULATORY REQUIREMENTS

A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

2.02 FLEXIBLE CLOSED CELL ELASTOMERIC CELLULAR INSULATION

A. Manufacturer:
   1. Aeroflex USA, Inc; www.aeroflexusa.com.
   2. Armacell LLC; AP Armaflex: www.armacell.us.
   3. K-Flex USA LLC; K-Flex Titan: www.kflexusa.com.

B. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
   1. Minimum Service Temperature: Minus 40 degrees F (Minus 40 degrees C).
   2. Maximum Service Temperature: 180 degrees F (82 degrees C).
   3. Connection: Waterproof vapor barrier adhesive.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Inserts and Shields:
   1. Application: Piping 1-1/2 inches (40 mm) diameter or larger.
   2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
   3. Insert location: Between support shield and piping and under the finish jacket.
   4. Insert Configuration: Minimum 6 inches (150 mm) long, of same thickness and contour as adjoining insulation; may be factory fabricated.

C. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 84 00.

D. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet (3 meters) above finished floor): Finish with canvas jacket sized for finish painting.

3.02 SCHEDULE

A. Refrigerant Piping: 1" Flexible closed cell elastomeric cellular insulation

END OF SECTION

SECTION 23 09 23

DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. System description.

B. Operator interface.

C. Controllers.

D. Controller software.

1.02 RELATED REQUIREMENTS

A. Section 23 09 93 - Sequence of Operations for HVAC Controls.

B. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 REFERENCE STANDARDS

A. ASHRAE Std 135 - BACnet - A Data Communication Protocol for Building Automation and Control Networks; 2016.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL (DIR) - Online Certifications Directory; Current Edition.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for each system component and software module.

C. Shop Drawings:
   1. Indicate trunk cable schematic showing programmable control unit locations, and trunk data conductors.
   2. Indicate system graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations. Provide demonstration digital media containing graphics.
   3. Show system configuration with peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
   4. Indicate description and sequence of operation of operating, user, and application software.

D. Manufacturer's Instructions: Indicate manufacturer's installation instructions for all manufactured components.

E. Designer's Qualification Statement.

F. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors.
   1. Revise shop drawings to reflect actual installation and operating sequences.
   2. Project Record Drawings. As-built versions of the submittal shop drawings provided as AutoCAD compatible files in electronic.

G. Operation and Maintenance Data:
   1. Include interconnection wiring diagrams complete field installed systems with identified and numbered, system components and devices.
   2. Include keyboard illustrations and step-by-step procedures indexed for each operator function.
   3. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.

H. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner s name and registered with manufacturer.

1.05 QUALITY ASSURANCE

A. Perform work in accordance with NFPA 70.

B. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.

C. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for purpose specified and indicated.

D. All portions of the system must be designed, furnished, installed, commissioned and serviced by manufacturer approved, factory trained employees.

E. The system shall have a documented history of compatibility by design for a minimum of 15 years. Future compatibility shall be supported for no less than 10 years. Compatibility shall be defined as the ability for any existing control system component including but not limited to building controllers, advanced application controllers, application specific, personal operator workstations and portable operator's terminals, to be connected and directly communicate with any new BAS system equipment without bridges, routers or protocol converters.

F. Supervision, checkout and commissioning of the system shall be by the local branch engineers and technicians directly employed by the Building Automation System Contractor. They shall perform commissioning and complete testing of the BAS system.

1.06 PROTECTION OF SOFTWARE RIGHTS

A. Prior to delivery of software, the Owner and the party providing the software will enter into a software license agreement with provisions for the following:
   1. Limiting use of software to equipment provided under these specifications.
   2. Limiting copying.
   3. Preserving confidentiality.
   4. Prohibiting transfer to a third party.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Siemens AG, Building Technologies Division; www.siemens.com.

2.02 SYSTEM DESCRIPTION

A. The Building Automation System (BAS) contractor shall furnish and install a networked system of HVAC controls. The contractor shall incorporate direct digital control (DDC) for central plant equipment, building ventilation equipment, supplemental heating and cooling equipment, and terminal units.

B. The control system for this project shall be an extension of the Owner’s existing Siemens Building Automation System and all controllers and software shall match existing or be latest version of existing.

C. The BAS shall be based on the Niagara Framework (or “Niagara”), a Java-based framework developed by Tridium. Niagara provides an automation infrastructure that integrates diverse systems and devices (regardless of manufacturer, communication standard or software) into a unified platform that can be managed in real time over the Internet using a standard Web browser.

D. The BAS shall be comprised of Network Area Controller or Controllers (NAC) within each facility. The NAC shall connect to the owner’s local or wide area network, depending on configuration. Access to the system, either locally in each building, or remotely from a central site or sites, shall be accomplished through standard Web browsers, via the Internet and/or local area network. Each NAC shall communicate to BACnet Building Controllers and other open and legacy protocol systems/devices.

E. Provide networking to new DDC equipment using industry accepted communication standards. System shall utilize BACnet communication according to ANSI/ASHRAE standard 135-2010 for interoperability with smart equipment, for the main IP communication trunk to the BAS Server and for peer-to-peer communication between DDC panels and devices. The system shall not be limited to only standard protocols, but shall also be able to integrate to a wide variety of third-party devices and applications via drivers and gateways.

F. Provide standalone controls where called for on the drawings or sequences.

G. The BAS shall be the Siemens TALON system as manufactured by Siemens Building Technologies.

2.03 BUILDING AUTOMATION SYSTEM NETWORK

A. All networked control products provided for this project shall be comprised of an industry standard open protocol internetwork. Communication involving control components (i.e. all types of controllers and operator interfaces) shall conform to ASHRAE 135-2010 BACnet standard. Networks and protocols proprietary to one company or distributed by one company are prohibited.

B. Access to system data shall not be restricted by the hardware configuration of the building management system. The hardware configuration of the BMS network shall be totally transparent to the user when accessing data or developing control programs.
   1. Software applications, features, and functionality, including administrative configurations, shall not be separated into several network control engines working together.

C. Provide at a minimum 1 operator interface to be designated as the BAS Server with server application software. Additional operator interfaces shall use operator workstation licenses or connect via a thick or thin-client application.

D. BAS Server shall be capable of simultaneous direct connection and communication with BACnet/IP, OPC and TCP/IP corporate level networks without the use of interposing devices.

E. Any break in Ethernet communication from the server to the controllers on the Primary Network shall result in a notification at the server.

F. Any break in Ethernet communication between the server and standard client workstations on the Primary Network shall result in a notification at each workstation.

G. Provide all communication media, connectors, repeaters, bridges, switches, and routers necessary for the internetwork.

H. Controllers and software shall be BTL listed at the time of installation.

I. The system shall meet 8peer-to-peer communication services such that the values in any one BACnet Building Controller or BACnet Advanced Application Controller can be read or changed from all other controllers without the need for intermediary devices. The software shall provide transparent transfer of all data, control programs, schedules, trends, and alarms from any one controller through the internetwork to any other controller, regardless of subnetwork routers.

J. Systems that use variations of BACnet using Point-to-Point (PTP) between controllers, gateways, bridges or networks that are not peer-to-peer are not allowed.

K. Remote Communications: Provide a TCP/IP compatible communication port for connection to the Owner's network for remote communications. Provide coordination with the Owner for addressing and router configuration on both ends of the remote network.

L. The system shall be installed with a 10% spare capacity on each subnetwork for the addition of future controllers.

2.04 OPERATOR INTERFACE

A. Workstation, controllers, and control backbone to communicate using BACnet protocol and addressing.

B. BACnet protocol to comply with ASHRAE Std 135.

2.05 CONTROLLERS

A. BUILDING CONTROLLERS

1. General:
    a. Manage global strategies by one or more, independent, standalone, microprocessor based controllers.
    b. Provide sufficient memory to support controller's operating system, database, and programming requirements.
    c. Share data between networked controllers.
    d. Controller operating system manages input and output communication signals allowing distributed controllers to share real and virtual object information and allowing for central monitoring and alarms.
    e. Utilize real-time clock for scheduling.
    f. Continuously check processor status and memory circuits for abnormal operation.
    g. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.
    h. Communication with other network devices to be based on assigned protocol.
2. Communication:
    a. Controller to reside on a BACnet network using ISO 8802-3 (ETHERNET) Data Link/Physical layer protocol.
    b. Perform routing when connected to a network of custom application and application specific controllers.
    c. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.
3. Anticipated Environmental Ambient Conditions:
    a. Outdoors and/or in Wet Ambient Conditions:
        1) Mount within waterproof enclosures.
        2) Rated for operation at 40 to 150 degrees F (4 to 65 degrees C).
    b. Conditioned Space:
        1) Mount within dustproof enclosures.
        2) Rated for operation at 32 to 120 degrees F (0 to 50 degrees C).
4. Provisions for Serviceability:
    a. Diagnostic LEDs for power, communication, and processor.
    b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
5. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
6. Power and Noise Immunity:
    a. Maintain operation at 90 to 110 percent of nominal voltage rating.
    b. Perform orderly shutdown below 80 percent of nominal voltage.
    c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet (1 m).

B. INPUT/OUTPUT INTERFACE

1. Hardwired inputs and outputs tie into the DDC system through building, custom application, or application specific controllers.
2. All Input/Output Points:
    a. Protect controller from damage resulting from any point short-circuiting or grounding and from voltage up to 24 volts of any duration.
    b. Provide universal type for building and custom application controllers where input or output is software designated as either binary or analog type with appropriate properties.
3. Binary Inputs:

a. Allow monitoring of On/Off signals from remote devices.
b. Provide wetting current of 12 mA minimum, compatible with commonly available control devices and protected against the effects of contact bounce and noise.
c. Sense dry contact closure with power provided only by the controller.

4. Pulse Accumulation Input Objects: Conform to all requirements of binary input objects and accept up to 10 pulses per second.
5. Analog Inputs:
   a. Allow for monitoring of low voltage 0 to 10 VDC, 4 to 20 mA current, or resistance signals (thermistor, RTD).
   b. Compatible with and field configurable to commonly available sensing devices.
6. Binary Outputs:
   a. Used for On/Off operation or a pulsed low-voltage signal for pulse width modulation control.
   b. Outputs provided with three position (On/Off/Auto) override switches.
   c. Status lights for building and custom application controllers to be selectable for normally open or normally closed operation.
7. Analog Outputs:
   a. Monitoring signal provides a 0 to 10 VDC or a 4 to 20 mA output signal for end device control.
   b. Provide status lights and two position (AUTO/MANUAL) switch for building and custom application controllers with manually adjustable potentiometer for manual override on building and custom application controllers.
   c. Drift to not exceed 0.4 percent of range per year.
8. Tri State Outputs:
   a. Coordinate two binary outputs to control three point, floating type, electronic actuators without feedback.
   b. Limit the use of three point, floating devices to the following zone and terminal unit control applications:
   c. Control algorithms run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.
9. System Object Capacity:
   a. System size to be expandable to twice the number of input output objects required by providing additional controllers, including associated devices and wiring.
   b. Hardware additions or software revisions for the installed operator interfaces are not to be required for future, system expansions.

2.06 CONTROLLER SOFTWARE

A. All applications reside and operate in the system controllers and editing of all applications occurs at the operator workstation.

B. System Security:
   1. User access secured via user passwords and user names.
   2. Passwords restrict user to the objects, applications, and system functions as assigned by the system manager.
   3. User Log On/Log Off attempts are recorded.
   4. Automatic Log Off occurs following the last keystroke after a user defined delay time.

C. Object or Object Group Scheduling:
   1. Weekly Schedules Based on Separate, Daily Schedules:
      a. Include start, stop, optimal stop, and night economizer.
      b. 10 events maximum per schedule.
      c. Start/stop times adjustable for each group object.

D. Provide standard application for equipment coordination and grouping based on function and location to be used for scheduling and other applications.

E. Alarms:
   1. Binary object is set to alarm based on the operator specified state.
   2. Analog object to have high/low alarm limits.
   3. All alarming is capable of being automatically and manually disabled.
   4. Alarm Reporting:
      a. Operator determines action to be taken for alarm event.
      b. Alarms to be routed to appropriate workstation.
      c. Reporting Options:

F. Maintenance Management: System monitors equipment status and generates maintenance messages based upon user-designated run-time limits.

G. Sequencing: Application software based upon specified sequences of operation in Section 23 09 93.

H. PID Control Characteristics:
   1. Direct or reverse action.
   2. Anti-windup.
   3. Calculated, time-varying, analog value, positions an output or stages a series of outputs.
   4. User selectable controlled variable, set-point, and PED gains.

I. Staggered Start Application:
   1. Prevents all controlled equipment from simultaneously restarting after power outage.
   2. Order of equipment startup is user selectable.

J. Energy Calculations:
   1. Accumulated instantaneous power or flow rates are converted to energy use data.
   2. Algorithm calculates a rolling average and allows window of time to be user specified in minute intervals.
   3. Algorithm calculates a fixed window average with a digital input signal from a utility meter defining the start of the window period that in turn synchronizes the fixed-window average with that used by the power company.

K. Anti-Short Cycling:
   1. All binary output objects protected from short-cycling.
   2. Allows minimum on-time and off-time to be selected.

L. On-Off Control with Differential:
   1. Algorithm allows binary output to be cycled based on a controlled variable and set-point.
   2. Algorithm to be direct-acting or reverse-acting incorporating an adjustable differential.

M. Run-Time Totalization:
   1. Totalize run-times for all binary input objects.
   2. Provides operator with capability to assign high run-time alarm.

2.07 WEB BASED CONTROLLER SOFTWARE FOR CONFIGURATION, PROGRAMMING AND OPERATORS

A. The purpose of this specification is to allow the Owner/Operator to have the same controller programming capabilities as the Controls Contractor Technician without additional software, tools, or licenses.
   1. The controller programming shall be accessible to any user via a Web Services application over an IP or Internet connection through port 80.

B. The following types of controllers shall have this feature:
   1. All BACnet BC level controllers
   2. Network Engine Controllers
   3. Controllers on equipment or sequences customized for this job

C. Manufacturer:
   1. Siemens Launch Pad™ (compatible with TC controllers)
   2. Controllers from other manufacturers shall meet the capabilities of this specification

D. The controller shall come with the software built-in and delivered with the controller as part of the controller purchase. It shall not require a separate software license to enable the software capability.
   1. The software shall be provided as an integral part of DDC Controllers and shall not be dependent upon any higher level computer or another controller for execution.

E. The software application shall be accessible from a PC using Web Services, but shall use all of its own services and data files so as to not be susceptible to Microsoft Windows operating systems based viruses.

F. Access to the controller software shall be username and password protected. User shall be authenticated by the controller.

G. The embedded Web Services shall provide the following functionality to users, based on their access and privilege rights:
   1. Point Navigation - Provide a screen that allows users to see all of the points that are active in the system. The points shall include hardwired, software, schedules, trends, alarms and network setup.
      a. The point navigation shall display the point name, descriptor, command priority, alarm status, and current value.
      b. The user shall be able to run and print a pre-configured point log report through a web interface client that shows the point name, descriptor, command priority, alarm status, and current value.
      c. The interface and report shall allow selection filter such that the operator can select or deselect the types of point that are visible.
   2. Alarm Display -displays current BAS alarms to which the user has access will be displayed. Users will be able to acknowledge active alarms, erase resolved alarms, and directly link to the Point Commanding feature.
      a. The alarm display must provide a filter that displays all alarms whether acknowledged or not.
      b. The alarm display must provide a filter that displays only alarms that have not yet been acknowledged.
      c. The alarm display must provide a persistent indication whenever there is one or more unacknowledged alarm in any connected field panel.
   3. Point details - users will have access to point detail information including operational status, operational priority, physical address, and alarm limits, for point objects to which they have access rights.
   4. Point Commanding - users will be able to override and command points they have access to via the Web browser interface.
   5. Scheduling - allows operators, depending on their current user privileges, to override schedules selected by date, and to modify the properties of a selected schedule.
      a. The scheduler display must be able to represent facility mode schedules in a graphical format.
   6. Trend Data Report - allows users to run and print a pre-configured trend data report for historical data reporting, including a representation of the alarm status of the each point for each Trend sample. The report shall allow selection of individual points or wildcard selection of points.
      a. Trend data shall be exportable to a data file, such as .csv or other comparable.
   7. Network navigation - Provide a screen that allows users to navigate to the panels and terminal units via the network architecture.

H. The web server shall be able to send SMTP text messages to notify users of alarm status. The owners shall provide a mail server and a connection port. SSL shall not be required.

PART 3 EXECUTION

3.01 INSTALLERS

A. Installer List:
   1. ACS.

3.02 INSTALLATION

A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.

B. Install software in control units and in operator work station. Implement all features of programs to specified requirements and appropriate to sequence of operation. Refer to Section 23 09 93.

C. Provide conduit and electrical wiring in accordance with Section 26 05 83. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

D. Update existing graphics to match new floor plan and equipment shown on the construction documents.

E. Provide conduit and electrical wiring in accordance with Section 26 05 83. Electrical material and installation shall be in accordance with appropriate requirements of Division 26. Provide EMT conduit with compression fittings for control wiring in all exposed areas. Refer to the reflected celling plan for exposed ceilings.

3.03 COORDINATION:

A. Coordinate IP drops, network connections, user interfaces, firewall, etc with Owner's IT representative.

B. Coordinate location of thermostats, humidistats, panels, and other exposed control components with plans and room details before installation.

C. Coordinate power for control units and operator workstation with electrical contractor.

D. Coordinate scheduling with the mechanical contractor and general contractor. Submit a schedule for approval based upon the installation schedule of the mechanical equipment.

E. Contractor shall integrate the Dakin VRF system into DDC controls.

3.04 MANUFACTURER'S FIELD SERVICES

A. Start and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.

END OF SECTION

SECTION 23 09 93

SEQUENCE OF OPERATIONS FOR HVAC CONTROLS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section defines the manner and method by which controls function. Requirements for each type of control system operation are specified. Equipment, devices, and system components required for control systems are specified in other sections.

B. Sequence of operation for:
   1. Dedicated Outside Air Unit
   2. VRF System
   3. Interior Lighting
   4. Exterior Lighting
   5. Outdoor Receptacle Control
   6. Hot Water Recirculation Control
   7. Water Heater Control
   8. Rooftop Unit

1.02 RELATED REQUIREMENTS

A. Section 23 09 23 - Direct-Digital Control System for HVAC.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Sequence of Operation Documentation: Submit written sequence of operation for entire HVAC system and each piece of equipment.

C. Control System Diagrams: Submit graphic schematic of the control system showing each control component and each component controlled, monitored, or enabled.

D. Points List: Submit list of all control points indicating at least the following for each point.

1.04 INTEGRATION WITH EXISTING MID CONTINENT PUBLIC LIBRARY CONTROL SYSTEM.

A. The control system shall be as indicated on the drawings and described in the specifications. The BAS contractor shall provide a BACnet DDC control system and provide all necessary labor and materials to integrate the DDC controller provided within this scope of work with full read/write capabilities. The BAS shall be able to communicate seamlessly with the existing front end system.

1.05 GENERAL REQUIREMENTS

A. The building automation system (BAS) controller shall supervise the building network and provide the following global information to the equipment controllers.
   1. Occupancy schedule (Adjustable)
   2. Base setpoint temperatures (Adjustable)
   3. Outdoor air temperature, relative humidity, and enthalpy - provide three sensors and use average value. Failure of one sensor shall cause it to be disabled and an alarm generated.

B. Equipment controller shall be furnished configured to accept control inputs from and provide outputs to the BAS controller for the control points listed on the construction documents.

C. Occupancy Schedules:
   1. Control of unoccupied vs occupied shall be handled through time of day schedules or motion control on the sensor.
   2. Schedule A:
      a. Sunday: 1pm to 5pm
      b. Monday to Thursday: 9am to 9pm

c. Friday: 9am to 6pm
d. Saturday: 10am to 6pm

3. Space shall remain in occupied mode until associated motion sensors are inactive for 30 minutes (adjustable)

D. Zone Temperature (base) set-points:
1. Occupied Heating = 70°F (adjustable)
2. Unoccupied Heating = 68°F (adjustable)
3. Occupied Cooling = 74°F (adjustable)
4. Unoccupied Cooling = 76°F (adjustable)
5. When an adjustable zone sensor is present, it shall be capable of adjusting the zone setpoint plus or minus 2°F (adjustable) from the value specified above.

E. Equipment controllers shall be furnished by the BAS contractor to operate the sequences listed in this specification.

F. Provide the following global information to the equipment controllers
1. Occupancy Schedules (adjustable)
2. Base setpoint temperatures (adjustable)
3. Outdoor air temperature - Provide two sensors and use average value. Failure of one sensor shall cause it to disable an alarm generated.
4. Outdoor air relative humidity
5. Outdoor air enthalpy

G. Failure of any of the above sensor shall generate an alarm.

H. Return Air Smoke Detector
1. The smoke detectors shall be rewired to the new units and shut down upon a signal from the fire alarm panel.

1.06 DEDICATED OUTSIDE AIR UNIT:

A. Occupied mode:
1. In the occupied mode the DOAU shall be enabled and the energy recovery wheel, cooling stages and the heating stages shall be controlled in sequence to maintain the discharge temperature set point of 72 degrees at 50% relative humidity max.
2. The variable speed units shall stage compressors and fan speed to run at a reduced capacity to match the loading. After 30-minutes (adjustable) of operating at the first stage, the second stage shall be engaged.

B. Unoccupied mode:
1. In the unoccupied mode the DOAU shall be off, the outdoor air dampers closed and the heating and cooling stages shall be off.

C. Unoccupied Override:
1. The DOAU shall be able to be enabled during occupied mode through the building automation system. Provide a graphic override button in BAS system for manual operation by the maintenance staff only.

D. Unit Controls:
1. Building Automation System (BAS) interface: The factory unit controller will interface with BACnet MSTP, IP and LON BAS systems. (Requires optional BACnet MSTP, BACnet IP, or LON card)
2. Head Pressure Control Condenser control: The condenser head pressure will be monitored by the unit controller to maintain head pressure and the compressor operating envelope at all times to avoid high pressure trips on high load days. ECM motors should be provided as well as factory sensors to provide this protection.

3. Compressor Envelope Control: The unit controller will continually monitor the suction and discharge pressure and temperature conditions during compressor operation. The unit will modulate the compressor, condenser head pressure, and electronic expansion valve to maintain a safe compressor operating conditions to add reliability, and limit unit shut down during fringe operating conditions.
4. CHANGE OVER SETPOINTS: The unit change over source temperature is the outdoor air temperature (OAT), The unit state will change from cooling, fan only or heating based on the change over heating or cooling setpoints.

E. Supply and Exhaust Fan Control:
1. The supply and exhaust fan(s) speed fan shall modulate to the set CFM rate scheduled and operate at a constant speed during occupied mode.
2. The system shall set an alarm if the supply or exhaust fan(s) status does not prove after a delay.

F. Heating Control:
1. The unit is provided with modulating gas heat.
2. Modulating Gas Heat: The modulating gas heat will be modulated by the unit controller to maintain the discharge air setpoint.heating DAT set point.

G. Cooling Control:
1. Discharge Air Control (DAT): In the cooling mode, the unit capacity will modulate the variable speed compressor to maintain the unit cooling discharge air set point. The cooling DAT set point will be adjustable at the unit controller. Unit capacity will be modulated by the variable speed compressor operation.
2. Cooling DAT reset: The cooling DAT setpoint may be reset by the space temp , return temp, OAT or external Voltage/mA signals. A linear relationship between the DAT and the reset variable will be created for the minimum and maximum DAT setpoints. As the reset variable changes the DAT will adjust according to the relationship.

H. CO2 Control:
1. When the space CO2 increase to above 1000ppm the outside air damper shall open to is maximum position and shall remain at max position until the CO2 level return to 600ppm. The damper shall than return back to minimum position.

I. MODULATING HOT GAS REHEAT
1. The unit is provided with fully modulating, sub cooling, hot gas reheat coil. The control sequence used for dehumidification in a Rebel unit uses two separate points of control. The first point is the leaving coil temperature sensor (LCT), and the second point is the discharge air temperature sensor (DAT). During dehumidification the refrigeration circuit controls the compressor(s) to maintain the LCT setpoint (adjustable) and the reheat coil is controlled to maintain the supply air reheat setpoint. The supply air reheat setpoint changes based on the whether there is a call for both cooling and dehumidification or a call for dehumidification only. When a call for both cooling and dehumidification is made the reheat setpoint is set as the cooling DAT setpoint. During a call for dehumidification only the reheat setpoint is reset in a linear manner between two endpoints referred to as the min and max reheat setpoints (adjustable). This reset is based on the cooling and heating setpoints for the RTU. This logic will send warmer supply air when the space is approaching the heating changeover setpoint and cooler supply air when the space is approaching cooling changeover setpoint. This logic prevents unnecessary fluctuations between cooling and heating states.
2. Rebel's dehumidification controls allow the unit to cool and dehumidify simultaneously or just dehumidify if no cooling is needed.
3. Reheat Always (no humidity sensor required2,3): The unit will always overcool the air to the LCT setpoint and reheat it to the reheat setpoint unless the unit is in the heating state.

J. Energy Recovery Wheel:

1. Wheel Control: The enthalpy wheel is turned on whenever the exhaust fan is running and the outdoor air dampers are at the minimum position (i.e. the unit is not in the economizer operating state). The wheel is shut off if the exhaust fan ever turns off or if the unit enters the economizer operating state.
    a. Wheel Effectiveness Control: The energy recovery wheel will start/stop or modulate its speed (if equipped with the optional VFD) to meet the discharge air temperature set point using factory mounted temperature sensors. The energy wheel is the first form of heating or cooling when active. Compressors or heat will only be active when the energy recovery wheel cannot satisfy the DAT.
    b. On/Off Defrost Control (standard option) - When the outside air temp is below an adjustable frost temperature (default 32F) the wheel is stopped for an adjustable period of time (default 5 minutes) once every 60 minutes (adjustable).
    c. Frost Prevention Control - The unit will monitor return air temperature and humidity, outside air temperature, and exhaust air temperature. Assuming an outdoor air relative humidity of 95% the unit will calculate the point at which condensate will develop in the exhaust air. When the exhaust air reaches this temperature the wheel will begin to modulate (VFD is included) to reduce the effectiveness of the wheel and avoid frost buildup. This allows the wheel to remain on at these frost prevention times and still recover some energy.

1.08 VARIABLE REFRIGERANT FLOW SYSTEM:

A. The VRF system shall be controlled by the manufacturers controller. The manufacturer shall submit their recommended sequence of operation for the owner, contractor, and commissioning agent to review.

B. The VRF system stall integrate into the BAS system. Coordinate requirements with equipment provider.

1.09 INTERIOR LIGHTING CONTROL:

A. The BAS shall control lighting contactors (provided and wired by EC) on a time of day schedule. All lighting through contactor shall turn on during building occupied hours. All lighting through contactor shall turn off during building unoccupied hours. Refer to electrical drawings for Lighting Contactor Locations

1.10 EXTERIOR LIGHTING CONTROL:

A. The BAS shall control lighting contactors (provided and wired by EC) on a sunrise/sunset schedule. Refer to electrical drawings for lighting contactor locations.

1.11 OUTDOOR RECEPTACLE CONTROL:

A. The BAS shall control lighting contactors (provided and wired by EC) on a time of day schedule. All outdoor receptacles through contactor shall turn on during building occupied hours. All outdoor receptacles through contactor shall turn off during building unoccupied hours. Refer to electrical drawings for lighting contactor location.

1.12 HOT WATER PUMP

A. During occupied mode, enable the hot water recirculating pump on. During unoccupied mode, the hot water recirculating pump shall be off.

1.13 GAS WATER HEATERS

A. Occupied mode:
    1. In the occupied mode the water heaters shall be enabled and maintain a supply temperature of 140-degree F (adjustable)

B. Unoccupied mode:
    1. In the unoccupied mode the water heaters shall be enabled and reduce the supply temperature to 90-degree F (adjustable)

1.14 ROOFTOP UNIT:

A. Occupied mode:

1. In the occupied mode the RTU shall be enabled and the economizer, cooling stages and the heating stages shall be controlled in sequence to maintain the space temperature set point.

2. The outside air damper shall open to the minimum position in occupied.

3. The variable speed units shall stage compressors and fan speed to run at a reduced capacity to match the loading. After 30-minutes (adjustable) of operating at the first stage, the second stage shall be engaged.

B. Unoccupied mode:

1. In the unoccupied mode the RTU shall be off, the outdoor air dampers closed and the heating and cooling stages shall be off.

2. If the space temperature moves beyond the unoccupied heating or cooling set points, the RTU fan shall be started, and the controller shall sequence the heating and cooling coils to maintain the unoccupied heating and cooling set points.

C. Unoccupied Override:

1. A pushbutton shall be provided on the space temperature sensor. During the unoccupied cycle, depressing the pushbutton shall return the RTU's to the occupied cycle for a two (2) hour time period (adjustable).

D. Economizer Control:

1. When the RTU is in the occupied mode, the outside air damper shall open to its preset minimum position (as determined by the CO2 sensor if applicable)

2. The controller shall allow economizing during all occupied and unoccupied modes. The economizer shall be enabled based on enthalpy control (adjustable). If economizing is initiated, the controller shall modulate the outside air damper between the active minimum position and fully open to maintain space comfort.

3. Economizing shall be disabled when the outside air temperature rises 5 degrees F above the economizer enable set point. In economizer mode the power exhaust shall be enabled to maintain a maximum building pressure set point of 0.05"(adjustable).

E. Supply Fan Control:

1. The supply fan shall operate whenever the heating and cooling stages are enabled. The fan speed shall match the associated heating and cooling stages.

2. The system shall set an alarm if the supply fan status does not prove after a delay.

F. Heating Control:

1. The gas heating shall modulate to maintain the space temperature setpoint.

2. The heating stage shall be disabled if the cooling coil is enabled or the supply fan is off.

G. Cooling Control:

1. The DX cooling shall be modulate to maintain the space temperature set point.

2. The cooling stages shall be disabled if the heating coil is enabled or the supply fan is off.

H. CO2 Control:

1. When the space CO2 increase to above 1000ppm the outside air damper shall open to is maximum position and shall remain at max position until the CO2 level return to 600ppm. The damper shall than return back to minimum position.

I. Optimal Start:

1. The BAS shall monitor the scheduled occupied time, occupied space set points and space temperature to calculate when the optimal start occurs.

J. Morning Warm-up Mode:

1. During optimal start, if the space temperature is below the occupied heating setpoint a morning warm-up shall be activated. When morning warm-up is initiated the unit shall enable the heating and supply fan. The outside air shall remain closed. When the space temperature reaches the occupied heating setpoint (adjustable), the unit shall transition to the occupied mode.

K. Pre-cool Mode:

1. During optimal start, if the space temperature is above the occupied cooling setpoint, pre-cool mode shall be activated. When pre-cool is initiated the unit shall enable the fan and cooling or economizer. The outside air damper shall remain closed, unless economizing. When the space temperature reaches occupied cooling setpoint (adj.), the unit shall transition to the occupied mode.

L. Optimal Stop:

1. The BAS shall monitor the scheduled unoccupied time, occupied setpoint and space temperature to calculate when the optimal stop occurs. When the optimal stop mode is active the unit controller shall maintain the space temperature to the space temperature offset setpoint

N. Dehumidification Control:

1. On call for dehumidification from the humidity sensor, the hot gas reheat shall modulate as required to maintain space setpoint temperature. When the humidity setpoint is satisfied, the cooling coil valve shall revert back to the cooling control sequence and the hot gas reheat valve shall close.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 23 23 00

REFRIGERANT PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping.

B. Refrigerant.

C. Moisture and liquid indicators.

D. Filter-driers.

1.02 RELATED REQUIREMENTS

A. Section 23 07 19 - HVAC Piping Insulation.

1.03 REFERENCE STANDARDS

A. ASHRAE Std 15 - Safety Standard for Refrigeration Systems; 2013.

B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings; 2013.

C. ASME B16.26 - Cast Copper Alloy Fittings for Flared Copper Tubes; 2013.

D. ASME B31.5 - Refrigeration Piping and Heat Transfer Components; 2016.

E. ASTM B88 - Standard Specification for Seamless Copper Water Tube; 2016.

F. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric); 2016.

G. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service; 2016.

H. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding; 2011 (Amended 2012).

1.04 SYSTEM DESCRIPTION

A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.

1.05 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.

PART 2 PRODUCTS

2.01 PIPING

A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
   1. Fittings: ASME B16.22 wrought copper.
   2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.

B. Copper Tube to 7/8 inch (22 mm) OD: ASTM B88 (ASTM B88M), Type K (A), annealed.
   1. Fittings: ASME B16.26 cast copper.
   2. Joints: Flared.

2.02 REFRIGERANT

A. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.

2.03 MOISTURE AND LIQUID INDICATORS

A. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F (93 degrees C) and maximum working pressure of 500 psi (3450 kPa).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install refrigeration specialties in accordance with manufacturer's instructions.

B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.

C. Install piping to conserve building space and avoid interference with use of space.

D. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.

E. Pipe Hangers and Supports:
   1. Install in accordance with ASME B31.5.
   2. Support horizontal piping as indicated.
   3. Install hangers to provide minimum 1/2 inch (13 mm) space between finished covering and adjacent work.
   4. Place hangers within 12 inches (300 mm) of each horizontal elbow.

F. Insulate piping; refer to Section and Section 23 07 16.

G. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.

H. Fully charge completed system with refrigerant after testing.

I. Use nitrogen for brazing and installation of pipe as required by the manufacturer.

3.02 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Test refrigeration system in accordance with ASME B31.5.

C. Pressure test system with dry nitrogen to 200 psi (1380 kPa). Perform final tests at 27 inches (92 kPa) vacuum and 200 psi (1380 kPa) using halide torch. Test to no leakage.

3.03 SCHEDULES

A. Hanger Spacing for Copper Tubing.
   1. 1/2 inch (13 mm), 5/8 inch (16 mm), and 7/8 inch (22 mm) OD: Maximum span, 5 feet (1500 mm); minimum rod size, 1/4 inch (6.3 mm).
   2. 1-1/8 inch (29 mm) OD: Maximum span, 6 feet (1800 mm); minimum rod size, 1/4 inch (6.3 mm).
   3. 1-3/8 inch (35 mm) OD: Maximum span, 7 feet (2100 mm); minimum rod size, 3/8 inch (9.5 mm).
   4. 1-5/8 inch (41 mm) OD: Maximum span, 8 feet (2400 mm); minimum rod size, 3/8 inch (9.5 mm).

END OF SECTION

SECTION 23 31 00
HVAC DUCTS AND CASINGS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Metal ductwork.

B. Casing and plenums.

C. Underground ductwork.

1.02 RELATED REQUIREMENTS

A. Section 23 05 93 - Testing, Adjusting, and Balancing for HVAC.

B. Section 23 07 13 - Duct Insulation: External insulation and duct liner.

C. Section 23 33 00 - Air Duct Accessories.

D. Section 23 37 00 - Air Outlets and Inlets.

1.03 REFERENCE STANDARDS

A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals Most Recent Edition Cited by Referring Code or Reference Standard.

B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.

C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2018.

D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2018b.

E. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements 2015.

F. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements 2015.

G. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements 2015.

H. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2018.

I. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2005 (Revised 2009).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data for duct materials.

PART 2 PRODUCTS

2.01 DUCT ASSEMBLIES

A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.

B. Ducts: Galvanized steel, unless otherwise indicated.

C. Low Pressure Supply (Heating Systems): 1/2 inch w.g. (125 Pa) pressure class, galvanized steel.

D. Low Pressure Supply (System with Cooling Coils): 1/2 inch w.g. (125 Pa) pressure class, galvanized steel.

E. Buried Supply: 10 inch w.g. pressure class, closed cell plastic material..

F. Outside Air Intake: 1/2 inch w.g. (125 Pa) pressure class, galvanized steel.

G. Emergency Generation Ventilation: 1/2 inch w.g. (125 Pa) pressure class, galvanized steel.

2.02 MATERIALS

A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.

B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.

1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.

2. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.

C. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.

D. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:

1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.

2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.

3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.

4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.

5. Other Types: As required.

2.03 DUCTWORK FABRICATION

A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.

B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE (FUND) Handbook - Fundamentals.

C. Duct systems have been designed for metal duct. At the Contractor's option, fibrous glass duct may be substituted for metal duct.

D. Provide duct material, gages, reinforcing, and sealing for operating pressures indicated.

E. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.

F. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

2.04 MANUFACTURED DUCTWORK AND FITTINGS

A. Double Wall Insulated Flat Oval Ducts: Machine made from round spiral lockseam duct.

1. Manufacture in accordance with SMACNA (DCS).

2. Fittings: Manufacture with solid inner wall.

3. Inner Wall: Perforated galvanized steel.

4. Insulation:

a. Thickness: 1 inch (25 mm) fiberglass.

5. Manufacturers:
    a. MKT Metal Manufacturing.
    b. L&L Fabrication.
    c. LINX Industries.

B. Double Wall Insulated Round Ducts: Round spiral lockseam duct with galvanized steel outer wall, perforated galvanized steel inner wall; fitting with solid inner wall.
1. Manufacture in accordance with SMACNA (DCS).
2. Insulation:
    a. Thickness: 1 inch (25 mm).
    b. Material: Air.
3. Manufacturers:
    a. MKT Metal Manufacturing; Weatherguard: www.mktduct.com/#sle.
    b. L&L Fabrication
    c. LINX Industries

C. Round Ducts: Round lockseam duct with galvanized steel outer wall.
1. Manufacture in accordance with SMACNA (DCS).

D. Flexible Ducts: Multiple layers of aluminum laminate supported by helically wound spring steel wire.
1. Pressure Rating: 10 inches WG (2.50 kPa) positive and 1.0 inches WG (250 Pa) negative.
2. Maximum Velocity: 4000 fpm (20.3 m/sec).
3. Temperature Range: Minus 20 degrees F to 210 degrees F (Minus 28 degrees C to 99 degrees C).

E. Round Duct Connection System: Interlocking duct connection system in accordance with SMACNA (DCS).

F. Underground Ductwork:
1. Manufacturers:
    a. The Blueduct by AQC Industries: www.aqcind.com
2. Complete duct system (including: plenums, round duct, run-outs, diffuser boots, etc.) must be from one manufacturer and be of the same material, construction and connection method throughout. Field made duct components are NOT acceptable.
3. Include the complete underground duct system including plenums and diffuser boots.
4. Provide elbows, duct, diffusers, plenum, clamp & gasket, boots, saddle registers and caulk as required by drawings for underground installation.
5. Ductwork shall be closed cell plastic material that is recyclable, does not emit volatile organic compounds, and conforms to ASTM-D2412. Ductwork shall not rust or crack under external stress or strain. Ductwork shall have integral R-10 equivalent thermal insulation valve, without the use of external insulation, per NSF's P374 Protocol and verify by a NSF thermal Testing Report.

6. All joints shall be sealed via gasket or bolts and sealant. Clamps and gaskets shall be used on ductwork without flanges. Clamps shall be polyethylene with stainless steel plates and stainless steel screws. Gaskets shall be polyethylene with stainless steel plates and stainless steel screws. Gaskets shall comprised of 1/4" thick butyl rubber sealant tape that is water and UV resistant and shall not stain. Gaskets shall comply with ASTM-E84 for flame and smoke spread.
7. Duct system shall be installed by a AQC Industries' trained installer.
8. Fiberglass style (FRP) ductwork or PVC coated galvanized steel ductwork shall NOT be acceptable.
9. Assemble ductwork shall be able to maintain pressure with no leakage.
10. Duct system shall carry a 10-year Limited Warranty.

2.05 CASINGS

A. Fabricate casings in accordance with SMACNA (DCS) and construct for operating pressures indicated.

B. Mount floor mounted casings on 4 inch (100 mm) high concrete curbs. At floor, rivet panels on 8 inch (200 mm) centers to angles. Where floors are acoustically insulated, provide liner of galvanized 18 gage, 0.0478 inch (1.21 mm) expanded metal mesh supported at 12 inch (300 mm) centers, turned up 12 inches (300 mm) at sides with sheet metal shields.

C. Reinforce door frames with steel angles tied to horizontal and vertical plenum supporting angles. Install hinged access doors where indicated or required for access to equipment for cleaning and inspection.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install, support, and seal ducts in accordance with SMACNA (DCS).

B. Install in accordance with manufacturer's instructions.

C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.

D. Buried Supply Duct: Insulate duct runs over 70 feet (20 m) long with 1 inch (25 mm) thick insulation covered with plastic vapor barrier.

E. Underground Ducts: Slope to plenums or low pump out points at 1:500. Provide access doors for inspection.

F. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.

G. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.

H. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.

END OF SECTION

SECTION 23 33 00

AIR DUCT ACCESSORIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Air turning devices/extractors.

B. Duct access doors.

C. Flexible duct connections.

D. Volume control dampers.

1.02 RELATED REQUIREMENTS

A. Section 23 31 00 - HVAC Ducts and Casings.

B. Section 23 36 00 - Air Terminal Units: Pressure regulating damper assemblies.

1.03 REFERENCE STANDARDS

A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems; 2018.

B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible; 2005 (Revised 2009).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide for shop fabricated assemblies including volume control dampers. Include electrical characteristics and connection requirements.

PART 2 PRODUCTS

2.01 AIR TURNING DEVICES/EXTRACTORS

A. Manufacturers:
   1. Carlisle HVAC Products; Dynair Hollow Vane and Rail (Double Wall Vane): www.carlislehvac.com.
   2. Elgen Manufacturing, Inc; www.elgenmfg.com.
   3. Krueger-HVAC, Division of Air System Components; www.krueger-hvac.com.
   4. Ruskin Company, a brand of Johnson Controls; www.ruskin.com.
   5. Titus HVAC, a brand of Johnson Controls; www.titus-hvac.com.

B. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

2.02 DUCT ACCESS DOORS

A. Manufacturers:
   1. Acudor Products Inc, a Division of Nelson Industrial Inc; www.acudor.com.
   2. Elgen Manufacturing, Inc; www.elgenmfg.com.
   3. Lloyd Industries, Inc; www.firedamper.com.
   4. Nailor Industries, Inc; www.nailor.com.
   5. Ruskin Company, a brand of Johnson Controls; www.ruskin.com.

B. Fabrication: Rigid and close-fitting of galvanized steel with sealing gaskets and quick fastening locking devices. For insulated ducts, install minimum 1 inch (25 mm) thick insulation with sheet metal cover.
   1. Less Than 12 inches (300 mm) Square: Secure with sash locks.
   2. Up to 18 inches (450 mm) Square: Provide two hinges and two sash locks.
   3. Up to 24 by 48 inches (600 by 1200 mm): Three hinges and two compression latches with outside and inside handles.

2.03 FLEXIBLE DUCT CONNECTIONS

A. Manufacturers:
   1. Carlisle HVAC Products; Dynair Connector Plus G90 Steel Offset Seam Neoprene Fabric: www.carlislehvac.com.
   2. Elgen Manufacturing, Inc; www.elgenmfg.com.

B. Fabricate in accordance with SMACNA (DCS) and as indicated.

C. Flexible Duct Connections: Fabric crimped into metal edging strip.
   1. Fabric: UL listed fire-retardant neoprene coated woven glass fiber fabric to NFPA 90A, minimum density 30 oz per sq yd (1.0 kg/sq m).
   2. Provide 1" wrapped insulation around flexible connections in exposed areas.

2.04 VOLUME CONTROL DAMPERS

A. Manufacturers:
   1. Louvers & Dampers, Inc, a brand of Mestek, Inc; www.louvers-dampers.com.
   2. Nailor Industries, Inc; www.nailor.com.
   3. NCA, a brand of Metal Industries Inc; www.ncamfg.com.

B. Single Blade Dampers:
   1. Fabricate for duct sizes up to 6 by 30 inch (150 by 760 mm).
   2. Blade: 24 gage, 0.0239 inch (0.61 mm), minimum.

C. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch (200 by 1825 mm). Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
   1. Blade: 18 gage, 0.0478 inch (1.21 mm), minimum.

D. Quadrants:
   1. Provide locking, indicating quadrant regulators on single and multi-blade dampers.
   2. On insulated ducts mount quadrant regulators on stand-off mounting brackets, bases, or adapters.
   3. Where rod lengths exceed 30 inches (750 mm) provide regulator at both ends.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 23 31 00 for duct construction and pressure class.

B. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 by 8 inch (200 by 200 mm) size for hand access, size for shoulder access, and as indicated. Provide 4 by 4 inch (100 by 100 mm) for balancing dampers only. Review locations prior to fabrication.

C. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.

D. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

END OF SECTION

SECTION 23 37 00

AIR OUTLETS AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Diffusers.

B. Registers/grilles.

1.02 RELATED REQUIREMENTS

A. Section 09 91 23 - Interior Painting: Painting of ducts visible behind outlets and inlets.

1.03 REFERENCE STANDARDS

A. AHRI 880 (I-P) - Performance Rating of Air Terminals; 2011 with Addendum 1.

B. ASHRAE Std 130 - Methods of Testing Air Terminal Units; 2016.

C. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittal procedures.

B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Krueger-HVAC, Division of Air System Components; www.krueger-hvac.com.

B. Price Industries; www.price-hvac.com.

C. Titus, a brand of Air Distribution Technologies; www.titus-hvac.com.

2.02 RECTANGULAR CEILING DIFFUSERS

A. Type: Provide Air Devices per schedule diffuser to discharge air in 360 degree, one way, two way, three way, and four way pattern.

B. Connections: As indicated on drawings.

C. Frame: Provide surface mount, snap-in, and inverted T-bar type. In plaster ceilings, provide plaster frame and ceiling frame.

D. Fabrication: Steel with baked enamel finish.

E. Color: As selected by Architect from manufacturer's standard range.

F. Accessories: Provide radial opposed blade and butterfly volume control damper; gaskets for surface mounted diffusers with damper adjustable from diffuser face.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Comply with SMACNA (ASMM) for flashing/counter-flashing of roof penetrations and supports for roof curbs and roof mounted equipment.

C. Check location of outlets and inlets and make necessary adjustments in position to conform with architectural features, symmetry, and lighting arrangement.

D. Install diffusers to ductwork with air tight connection.

E. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.

F. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 09 91 23.

END OF SECTION

SECTION 23 74 13
PACKAGED OUTDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Packaged roof top unit.

B. Unit controls.

C. Remote panel.

D. Roof mounting curb and base.

1.02 RELATED REQUIREMENTS

A. Section 07 72 00 - Roof Accessories: Placement and installation of factory fabricated roof mounting curbs.

B. Section 23 05 48 - Vibration and Seismic Controls for HVAC.

C. Section 26 05 83 - Wiring Connections: Installation and wiring of thermostats and other controls components; wiring from unit terminal strip to remote panel.

D. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Daikin Applied

B. Bid Alternate: Aaon

2.02 MANUFACTURED UNITS

A. General: Roof mounted units having gas burner and electric refrigeration.

B. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, heat exchanger and burner, heat recovery coil, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.

2.03 FABRICATION

A. Cabinet: Steel with baked enamel finish, including access doors with piano hinges and locking handle. Structural members shall be minimum 18 gage, 0.0478 inch (1.21 mm), with access doors or panels of minimum 20 gage, 0.0359 inch (0.91 mm).

B. Insulation: 2 inch (50 mm) thick neoprene coated glass fiber with edges protected from erosion.

C. Heat Exchangers: Stainless steel, of welded construction.

D. Supply Fan: Forward curved centrifugal type, resiliently mounted with V-belt drive, adjustable variable pitch pulley, and rubber isolated hinge mounted high efficiency motor or direct drive as indicated. Isolate complete fan assembly. Refer to Section 23 05 48.

E. Air Filters:

1. 2 inch (50 mm) thick glass fiber disposable media in metal frames.

F. Roof Mounting Curb: 14 inches (350 mm) high galvanized steel, channel frame with gaskets, nailer strips. Field insulate curb.

2.04 BURNER

A. Gas Burner: Induced draft type burner with adjustable combustion air supply, pressure regulator, gas valves, manual shut-off, intermittent spark or glow coil ignition, flame sensing device, and automatic 100 percent shut-off pilot.

B. Gas Burner Safety Controls: Energize ignition, limit time for establishment of flame, prevent opening of gas valve until pilot flame is proven, stop gas flow on ignition failure, energize blower motor, and after air flow proven and slight delay, allow gas valve to open.

2.05 EVAPORATOR COIL

A. Provide copper tube aluminum fin coil assembly with galvanized drain pan and connection.

B. Provide capillary tubes or thermostatic expansion valves for units of 6 tons (21 kw) capacity and less, and thermostatic expansion valves and alternate row circuiting for units 7.5 tons (26 kw) cooling capacity and larger.

2.06 COMPRESSOR

A. Provide Variable Speed compressors, 3600 rpm maximum, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gauge ports, and filter drier.

2.07 CONDENSER COIL

A. Provide copper tube aluminum fin coil assembly with subcooling rows and coil guard.

B. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.

2.08 MIXED AIR CASING

A. Dampers: Provide outside, return, and relief dampers with damper operator and control package to automatically vary outside air quantity. Outside air damper to fall to closed position. Relief dampers may be gravity balanced.

2.09 ACCESSORIES

A. Refer to Schedule.

2.10 OPERATING CONTROLS

A. Provide low voltage, adjustable room thermostat to control burner operation, compressor and condenser fan, and supply fan to maintain temperature setting.

1. Include system selector switch (heat-off-cool) and fan control switch (auto-on).

2. Locate thermostat in room as shown.

B. Provide terminal strip on unit for connection of operating controls to remote panel by others. Control shall allow for Multiple stages of heating and multiple stages cooling.

C. Refer to specification sections 23 09 23 and 23 09 93 for

2.11 HEAT RECOVERY COIL

A. Provide copper tube aluminum fin coil assembly with multiple circuits arranged to provide heat recovery.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Mount units on factory built roof mounting curb providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

C. Units shall not operate during construction for installation of floor, paint, drywall, or any construction material. Contractor shall provide temporary cooling units under their own cost for installation of construction material.

3.02 SYSTEM STARTUP

A. Prepare and start equipment. Adjust for proper operation.

B. Engage a factory-authorized service representative to perform startup service.

C. Complete installation and startup checks according to manufacturer's written instruction. Submit start up sheets to engineer for review.

D. After startup and performance testing and prior to substantial completion, replace existing filters with new filters.

END OF SECTION

SECTION 23 74 33

DEDICATED OUTDOOR AIR UNITS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Packaged Rooftop Air Conditioners
   1. Controls.

1.02 REFERENCE STANDARDS

A. AFBMA 9 - Load Ratings and Fatigue Life for Ball Bearings.

B. AMCA 99-Standards Handbook

C. AMCA 210-Laboratory Methods of Testing Fans for Rating Purposes

D. AMCA 500-Test Methods for Louver, Dampers, and Shutters.

E. AHRI 340/360 - Unitary Large Equipment

F. NEMA MG1-Motors and Generators

G. National Electrical Code.

H. NFPA 70-National Fire Protection Agency.

I. SMACNA-HVAC Duct Construction Standards-Metal and Flexible.

J. UL 900-Test Performance of Air Filter Units.

1.03 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data with dimensions, duct and service connections, accessories, controls, electrical nameplate data, and wiring diagrams.

C. Operation And Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.

D. Warranty: Submit manufacturers warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the type of work specified in this section with minimum 5 years of documented experience and approved by manufacturer.

1.05 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturers warranty for part and labor compressor/condenser unit.

C. Provide ten year manufacturers warranty for parts and labor for heat exchanger.

D. Provide a one year manufacturers warranty on all parts and labor. The warranty period shall commence at startup or six months after shipment, whichever occurs first.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Daikin Applied

B. Bid Alternate: Aaon

2.02 CABINET, CASING, AND FRAME

A. Panel construction shall be double-wall construction for all panels. All floor panels shall have a solid galvanized steel inner liner on the air stream side of the unit to protect insulation during service and maintenance. Insulation shall be a minimum of 1" thick with an R-value of 7.0, and shall be 2 part injected foam. Panel design shall include no exposed insulation edges. Unit cabinet shall be designed to operate at total static pressures up to 5.0 inches w.g.

B. Exterior surfaces shall be constructed of pre-painted galvanized steel for aesthetics and long term durability. Paint finish to include a base primer with a high quality, polyester resin topcoat of a neutral beige color. Finished panel surfaces to withstand a minimum 1000-hour salt spray test in accordance with ASTM B117 standard for salt spray resistance.

C. Service doors shall be provided on the fan section, filter section, control panel section, and heating vestibule in order to provide user access to unit components. All service access doors shall be mounted on multiple, stainless steel hinges and shall be secured by a latch system. Removable service panels secured by multiple mechanical fasteners are not acceptable.

D. The unit base shall overhang the roof curb for positive water runoff and shall seat on the roof curb gasket to provide a positive, weathertight seal. Lifting brackets shall be provided on the unit base to accept cable or chain hooks for rigging the equipment.

2.03 FILTERS

A. Unit shall be provided with a draw-through filter section. The filter rack shall be designed to accept a 2” prefilter and a 4” final filter. The unit design shall have a hinged access door for the filter section. The manufacturer shall ship the rooftop unit with 2” MERV 8 construction filters. The contractor shall furnish and install, at building occupancy, the final set of filters per the contract documents.

2.04 COOLING COIL

A. The indoor coil section shall be installed in a draw through configuration, upstream of the supply air fan. The coil section shall be complete with a factory piped cooling coil and an ASHRAE 62.1 compliant double sloped drain pan.

B. The direct expansion (DX) cooling coils shall be fabricated of seamless high efficiency copper tubing that is mechanically expanded into high efficiency aluminum plate fins. Coils shall be a multi-row, staggered tube design with a minimum of 3 rows. All cooling coils shall have an interlaced coil circuiting that keeps the full coil face active at all load conditions. All coils shall be factory leak tested with high pressure air under water.

C. The cooling coil shall have an electronic controlled expansion valve. The unit controller shall control the expansion valve to maintain liquid subcooling and the superheat of the refrigerant system.

D. The refrigerant suction lines shall be fully insulated from the expansion valve to the compressors.

E. The drain pan shall be stainless steel and positively sloped. The slope of the drain pan shall be in two directions and comply with ASHRAE Standard 62.1. The drain pan shall have a minimum slope of 1/8" per foot to provide positive draining. The drain pan shall extend beyond the leaving side of the coil. The drain pan shall have a threaded drain connection extending through the unit base.

2.05 HOT GAS REHEAT COIL

A. Unit shall be equipped with a fully modulating hot gas reheat coil with hot gas coming from the unit condenser

B. Hot gas reheat coil shall be a Micro Channel design. The aluminum tube shall be a micro channel design with high efficiency aluminum fins. Fins shall be brazed to the tubing for a direct bond. The capacity of the reheat coil shall allow for a 20°F temperature rise at all operating conditions.

C. The modulating hot gas reheat systems shall allow for independent control of the cooling coil leaving air temperature and the reheat coil leaving air temperature. The cooling coil and reheat coil leaving air

temperature setpoints shall be adjustable through the unit controller. During the dehumidification cycle the unit shall be capable of 100% of the cooling capacity. The hot gas reheat coil shall provide discharge temperature control within +/- 2°F.

D. Each coil shall be factory leak tested with high-pressure air under water.

2.06 HEATING SECTION

A. A. The rooftop unit shall include a natural gas heating section. The gas furnace design shall be one natural gas fired heating module factory installed downstream of the supply air fan in the heat section. The heating module shall be a tubular design with in-shot gas burners.

B. The module shall be complete with furnace controller and control valve capable of 5:1 modulating operation.

C. The heat exchanger tubes shall be constructed of stainless steel.

D. The module shall have an induced draft fan that will maintain a negative pressure in the heat exchanger tubes for the removal of the flue gases

E. Each burner module shall have two flame roll-out safety protection switches and a high temperature limit switch that will shut the gas valve off upon detection of improper burner manifold operation. The induced draft fan shall have an airflow safety switch that will prevent the heating module from turning on in the event of no airflow in the flue chamber

2.07 FAN

A. Supply fan shall be a single width, single inlet (SWSI) airfoil centrifugal fan. The fan wheel shall be Class II construction with fan blades that are continuously welded to the hub plate and end rim. The supply fan shall be a direct drive fan mounted to the motor shaft. Belts and sheaves are not acceptable due to the additional maintenance.

B. All fan assemblies shall be statically and dynamically balanced at the factory, including a final trim balance, prior to shipment.

C. Supply fan and motor assembly combinations larger than 8 hp or 22” diameter shall be internally isolated on 1” deflection, spring isolators and include removable shipping tie downs.

D. The fan motor shall be a totally enclosed EC motor that is speed controlled by the rooftop unit controller. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase. Motors shall be premium efficiency.

E. The supply fan shall be capable of airflow modulation from 30% to 100% of the scheduled designed airflow. The fan shall not operate in a state of surge at any point within the modulation range.

2.08 CONDENSING SECTION

A. Outdoor coils shall be cast aluminum, micro-channel coils. Plate fins shall be protected and brazed between adjoining flat tubes such that they shall not extend outside the tubes. A sub-cooling coil shall be an integral part of the main outdoor air coil. Each outdoor air coil shall be factory leak tested with high-pressure air under water.

B. Fan motors shall be an ECM type motor for proportional control. The unit controller shall proportionally control the speed of the condenser fan motors to maintain the head pressure of the refrigerant circuit from ambient condition of 25~120°F. Mechanical cooling shall be provided to 25º F. The motor shall include thermal overload protection and protect the motor in the case of excessive motor temperatures. The motor shall have phase failure protection and prevent the motor from operation in the event of a loss of phase.

C. The condenser fan shall be low noise blade design. Fan blade design shall be a dynamic profile for low tip speed. Fan blade shall be of a composite material.

D. The unit shall have scroll compressors. One of the compressors shall be an inverter compressor providing proportional control. The unit controller shall control the speed of the compressor to maintain the discharge air temperature. The inverter compressor shall have a separate oil pump and an oil separator for each compressor that routes oil back to the compressor instead of through the discharge line.

E. Pressure transducers shall be provided for the suction pressure and head pressure. Temperature sensor shall be provided for the suction temperature and the refrigerant discharge temperature of the compressors. All of the above devices shall be an input to the unit controller and the values be displayed at the unit controller.

F. Refrigerant circuit shall have a bypass valve between the suction and discharge refrigerant lines for low head pressure compressor starting and increased compressor reliability. When there is a call for mechanical cooling the bypass valve shall open to equalizing the suction and discharge pressures. When pressures are equalized the bypass valve shall close and the compressor shall be allowed to start.

G. Each circuit shall be dehydrated and factory charged with R-410A Refrigerant and oil.

2.09 CONTROLS

A. Controls: Provided terminal strip for control of unit by building automation system.

2.10 ELECTRICAL

A. Unit wiring shall comply with NEC requirements and with all applicable UL standards. All electrical components shall be UL recognized where applicable. All wiring and electrical components provided with the unit shall be number and color-coded and labeled according to the electrical diagram provided for easy identification. The unit shall be provided with a factory wired weatherproof control panel. Unit shall have a single point power terminal block for main power connection. A terminal board shall be provided for low voltage control wiring. Branch short circuit protection, 115-volt control circuit transformer and fuse, system switches, and a high temperature sensor shall also be provided with the unit. Each compressor and condenser fan motor shall be furnished with contactors and inherent thermal overload protection. Supply fan motors shall have contactors and external overload protection. Knockouts shall be provided in the bottom of the main control panels for field wiring entrance.

B. A single non-fused disconnect switch shall be provided for disconnecting electrical power at the unit. Disconnect switches shall be mounted internally to the control panel and operated by an externally mounted handle.

2.11 ROOF CURB

A. A prefabricated heavy gauge galvanized steel, mounting curb shall be provided for field assembly on the roof decking prior to unit shipment. The roof curb shall be a full perimeter type with complete perimeter support of the air handling section and condensing section. The curb shall be a minimum of 14" high and include a nominal 2" x 4" wood nailing strip. Gasket shall be provided for field mounting between the unit base and roof curb.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install to NFPA 90A.

END OF SECTION

SECTION 23 81 29

VARIABLE REFRIGERANT FLOW HVAC SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Variable refrigerant volume HVAC system includes:
   1. Outdoor/condensing unit(s).
   2. Indoor/evaporator units.
   3. Branch selector units.
   4. Refrigerant piping.
   5. Control panels.
   6. Control wiring.

1.02 RELATED REQUIREMENTS

A. Section 23 23 00 - Refrigerant Piping: Additional requirements for refrigerant piping system.

1.03 REFERENCE STANDARDS

A. AHRI 210/240 - Standard for Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment; 2008, Including All Addenda.

B. ITS (DIR) - Directory of Listed Products; current edition.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 1995 - Heating and Cooling Equipment; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Submit manufacturer's standard data sheets showing the following for each item of equipment, marked to correlate to equipment item markings indicated in the Contract Documents:
   1. Outdoor/Central Units:
      a. Refrigerant Type and Size of Charge.
      b. Cooling Capacity: Btu/h (W).
      c. Heating Capacity: Btu/h (W).
      d. Cooling Input Power: Btu/h (kW).
      e. Heating Input Power: Btu/h (kW).
      f. Operating Temperature Range, Cooling and Heating.
      g. Air Flow: Cubic feet per minute (Cubic meters per second).
      h. Fan Curves.
      i. External Static Pressure (ESP): Inches WG (Pa).
      j. Sound Pressure Level: dB(A).
      k. Electrical Data:
         1) Maximum Circuit Amps (MCA).
         2) Maximum Fuse Amps (MFA).
         3) Maximum Starting Current (MSC).
         4) Full Load Amps (FLA).
         5) Total Over Current Amps (TOCA).
         6) Fan Motor: HP (W).
      l. Weight and Dimensions.
      m. Maximum number of indoor units that can be served.
      n. Maximum refrigerant piping run from outdoor/condenser unit to indoor/evaporator unit.

o. Maximum height difference between outdoor/condenser unit to indoor/evaporator unit, both above and below.
p. Control Options.

2. Indoor/Evaporator Units:
   a. Cooling Capacity: Btu/h (W).
   b. Heating Capacity: Btu/h (W).
   c. Cooling Input Power: Btu/h (kW).
   d. Heating Input Power: Btu/h (kW).
   e. Air Flow: Cubic feet per minute (Cubic meters per second).
   f. Fan Curves.
   g. External Static Pressure (ESP): Inches WG (Pa).
   h. Sound Pressure level: dB(A).
   i. Electrical Data:
      1) Maximum Circuit Amps (MCA).
      2) Maximum Fuse Amps (MFA).
      3) Maximum Starting Current (MSC).
      4) Full Load Amps (FLA).
      5) Total Over Current Amps (TOCA).
      6) Fan Motor: HP (W).
   j. Maximum Lift of Built-in Condensate Pump.
   k. Weight and Dimensions.
   l. Control Options.
3. Control Panels: Complete description of options, control points, zones/groups.

1.05 QUALITY ASSURANCE

A. Installer Qualifications: The system must be installed by a manufacturer-trained contractor/dealer.
   1. The bidders shall be required to submit training certification proof with bid documents.
   2. The installing contractor must submit with bid documents documentation of successful installation of variable refrigerant volume system of the manufacturer and models included in the bid, covering a total conditioned floor area of at least 25,000 square feet in at least three separate locations combined. These systems must have been installed with his manpower and under his direct supervision. The contractor must furnish contact information for individuals employed at these locations and with knowledge of the systems, at these locations that can verify the successful installation and start-up, operations of the systems, and follow-up support of the contractor with these installed systems.
   3. Verification of this information and references from these individuals is a requirement for the general contractor's bid to be considered responsive. The general contractor is responsible to confirm that the VRV contractors and equipment manufacturers are qualified based on these requirements prior to bid. Failure to successfully do so will disqualify their bid.

1.06 WARRANTY

A. Compressor and all parts and is limited in duration to ten (10) years starting from the ‘’installation date’’ which is one of the two dates below:
   1. The installation date is the date that the unit is originally commissioned, but no later than 18 months after the manufacture date noted on the unit’s rating plate.
   2. If the date the unit is originally commissioned cannot be verified, the installation date is three months after the manufacture date.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Basis of Design: The system design indicated in the Contract Documents is based on equipment and system designed by Daikin AC; www.daikinac.com.

B. Bid Alternate: LG

2.02 HVAC SYSTEM DESIGN

A. System Operation: Heating and cooling, simultaneously.
   1. Zoning: Provide capability for temperature control for each individual indoor/evaporator unit independently of all other units.
   2. Zoning: Provide heating/cooling selection for each individual indoor/evaporator unit independently of all other units.
   3. Provide a complete functional system that achieves the specified performance based on the specified design conditions and that is designed and constructed according to the equipment manufacturer's requirements.
   4. Conditioned spaces are indicated on drawings.
   5. Outdoor/Condenser unit locations are indicated on drawings.
   6. Indoor/Evaporator unit locations are indicated on drawings.
   7. Branch selector unit locations are not indicated on drawings.
   8. Required equipment unit capacities are indicated on drawings.
   9. Refrigerant piping sizes are not indicated on drawings.
   10. Connect equipment to condensate piping provided by others; condensate piping is indicated on drawings.

B. Operating Temperature Ranges:
   1. Simultaneous Heating and Cooling Operating Range: minus 4 degrees F (minus 20 degrees C) to 60 degrees F (16 degrees C) dry bulb.
   2. Cooling Mode Operating Range: minus 4 degrees F (minus 20 degrees C) to 110 degrees F (43 degrees C) dry bulb.
   3. Heating Mode Operating Range: 0 degrees F (minus 18 degrees C) to 77 degrees F (25 degrees C) dry bulb; minus 4 degrees F (minus 20 degrees C) to 60 degrees F (16 degrees C) wet bulb; without low ambient controls or auxiliary heat source.

C. Refrigerant Piping Lengths: Provide equipment capable of serving system with following piping lengths without any oil traps:
   1. Minimum Piping Length from Outdoor/Central Unit(s) to Furthest Terminal Unit: 540 feet (165 m), actual; 620 feet (189 m), equivalent.
   2. Total Combined Liquid Line Length: 3280 feet (1000 m), minimum.
   3. Minimum Piping Length Between Indoor Units: 49 feet (15 mm).

D. Control Wiring Lengths:
   1. Between Outdoor/Condenser Unit and Indoor/Evaporator Unit: 6,665 feet (2031 m), minimum.
   2. Between Outdoor/Condenser Unit and Central Controller: 3,330 feet (1015 m), minimum.
   3. Between Indoor/Evaporator Unit and Remote Controller: 1,665 feet (507 m).

2.03 EQUIPMENT

A. All Units: Factory assembled, wired, and piped and factory tested for function and safety.
   1. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.
   2. Performance Certification: AHRI Certified; www.ahrinet.org.
   3. Safety Certification: Tested to UL 1995 by UL or Intertek-ETL, listed in ITS (DIR), and bearing the certification label.

4. Provide outdoor/condensing units capable of serving indoor unit capacity up to 200 percent of the capacity of the outdoor/condensing unit.
5. Provide units capable of serving the zones indicated.
6. Thermal Performance: Provide heating and cooling capacity as indicated, based on the following nominal operating conditions:
7. Energy Efficiency: Report EER and COP based on tests conducted at "full load" in accordance with AHRI 210/240 or alternate test method approved by U.S. Department of Energy.

B. Electrical Characteristics:
1. Power - Condensing Units: 208 to 230 Volts, 3-phase, 60 Hz.
2. Power - Branch Selector Units: 208 to 230 Volts, single phase, 60 Hz.
3. Power - Indoor Units: 208 to 230 Volts, single phase, 60 Hz.
4. 208-230 Voltage Range: 187 to 253 volts.
5. Control: 16 volts DC.

C. System Controls:
1. Include self diagnostic, auto-check functions to detect malfunctions and display the type and location.

D. Remote Centralized Control Panel:

E. Unit Controls: As required to perform input functions necessary to operate system; provided by manufacturer of units.

F. Refrigerant Piping:
1. Provide three-pipe refrigerant system, including high/low pressure dedicated hot gas, liquid and suction lines; two-pipe systems utilizing lower temperature mixed liquid/gas refrigerant to perform heat recovery are not permitted due to reduced heating capabilities.
2. Refrigerant Flow Balancing: Provide refrigerant piping joints and headers specifically designed to ensure proper refrigerant balance and flow for optimum system capacity and performance; T-style joints are prohibited.
3. Insulate each refrigerant line individually between the condensing and indoor units.

2.04 OUTDOOR/CONDENSING UNITS

A. Outdoor/Condensing Units: Air-cooled DX refrigeration units, designed specifically for use with indoor/evaporator units; factory assembled and wired with all necessary electronic and refrigerant controls; modular design for ganging multiple units.
1. Refrigeration Circuit: Scroll compressors, motors, fans, condenser coil, electronic expansion valves, solenoid valves, 4-way valve, distribution headers, capillaries, filters, shut off valves, oil separators, service ports and refrigerant regulator.
2. Refrigerant: Factory charged.
3. Variable Volume Control: Modulate compressor capacity automatically to maintain constant suction and condensing pressures while varying refrigerant volume to suit heating/cooling loads.
4. Capable of being installed with wiring and piping to the left, right, rear or bottom.
5. Capable of heating operation at low end of operating range as specified, without additional low ambient controls or auxiliary heat source; during heating operation, reverse cycle (cooling mode) oil return or defrost is not permitted, due to potential reduction in space temperature.
6. Sound Pressure Level: As specified, measured at 3 feet (one meter) from front of unit; provide night setback sound control as a standard feature; three selectable sound level steps of 55 dB, 50 dB, and 45 dB, maximum.
7. Power Failure Mode: Automatically restart operation after power failure without loss of programmed settings.
8. Provide refrigerant auto-charging feature and refrigerant charge check function.

9. Safety Devices: High pressure sensor and switch, low pressure sensor/switch, control circuit fuses, crankcase heaters, fusible plug, overload relay, inverter overload protector, thermal protectors for compressor and fan motors, over current protection for the inverter and anti-recycling timers.
10. Provide refrigerant sub-cooling to ensure the liquid refrigerant does not flash when supplying to us indoor units.
11. Oil Recovery Cycle: Automatic, occurring 2 hours after start of operation and then every 8 hours of operation; maintain continuous heating during oil return operation.
12. Controls: Provide contacts for electrical demand shedding.
13. Product:
    a. Daikin REYQ Series ("heat recovery").

B. Unit Cabinet: Weatherproof and corrosion resistant; rust-proofed mild steel panels coated with baked enamel finish.
1. Designed to allow side-by-side installation with minimum spacing.

C. Fans: One or more direct-drive propeller type, vertical discharge, with multiple speed operation via DC (digitally commutating) inverter.
1. Provide minimum of 2 fans for each condensing unit.
2. External Static Pressure: Factory set at 0.12 in WG (30 Pa), minimum.
3. Indoor Mounted Air-Cooled Units: External static pressure field set at 0.32 in WG (80 Pa), minimum; provide for mounting of field-installed ducts.
4. Fan Airflow: As indicated for specific equipment.
5. Fan Motors: Factory installed; permanently lubricated bearings; inherent protection; fan guard; output as indicated for specific equipment.

D. Condenser Coils: Copper tubes expanded into aluminum fins to form mechanical bond; waffle louver fin and rifled bore tube design to ensure high efficiency performance.
1. Copper Tube: Hi-X seamless copper tube.
2. Provide hail guards on condenser coils.

E. Compressors: Scroll type, hermetically sealed, variable speed inverter-driven and fixed speed in combination to suit total capacity; minimum of one variable speed, inverter driven compressor per condenser unit; minimum of two compressors per condenser unit; capable of controlling capacity within range of 6 percent to 100 percent of total capacity.
1. Multiple Condenser Modules: Balance total operation hours of compressors by means of duty cycling function, providing for sequential starting of each module at each start/stop cycle, completion of oil return, and completion of defrost, or every 8 hours.
2. Failure Mode: In the event of compressor failure, operate remaining compressor(s) at proportionally reduced capacity; provide microprocessor and associated controls specifically designed to address this condition.
3. Provide each compressor with crankcase heater, high pressure safety switch, and internal thermal overload protector.
4. Provide oil separators and intelligent oil management system.
5. Provide spring mounted vibration isolators.

2.05 BRANCH SELECTOR UNITS

A. Branch Selector Units: Concealed boxes designed specifically for this type of system to control heating/cooling mode selection of downstream units; consisting of electronic expansion valves, subcooling heat exchanger, refrigerant control piping and electronics to facilitate communications between unit and main processor and between branch unit and indoor/evaporator units.
1. Control direction of refrigerant flow using electronic expansion valves; use of solenoid valves for changeover and pressure equalization is not permitted due to refrigerant noise; use of multi-port branch selector boxes is not permitted unless spare ports are provided for redundancy.

2. Provide one electronic expansion valve for each downstream unit served, except multiple indoor/evaporator units may be connected, provided balancing joints are used in downstream piping and total capacity is within capacity range of the branch selector.
3. When branch unit is simultaneously heating and cooling, energize subcooling heat exchanger.
4. Casing: Galvanized steel sheet; with flame and heat resistant foamed polyethylene sound and thermal insulation.
5. Refrigerant Connections: Braze type.
6. Condensate Drainage: Provide unit that does not require condensate drainage.
7. Products:
    a. Daikin BSxQ Series.

2.06 INDOOR/EVAPORATOR UNITS

A. All Indoor/Evaporator Units: Factory assembled and tested DX fan-coil units, with electronic proportional expansion valve, control circuit board, factory wiring and piping, self-diagnostics, auto-restart function, 3-minute fused time delay, and test run switch.
    1. Refrigerant: Refrigerant circuits factory-charged with dehydrated air, for field charging.
    2. Temperature Control Mechanism: Return air thermistor and computerized Proportional-Integral-Derivative (PID) control of superheat.
    3. Coils: Direct expansion type constructed from copper tubes expanded into aluminum fins to form a mechanical bond; waffle louver fin and high heat exchange, rifled bore tube design; factory tested.
        a. Provide thermistor on liquid and gas lines.
    4. Fans: Direct-drive, with statically and dynamically balanced impellers; high and low speeds unless otherwise indicated; motor thermally protected.
    5. Return Air Filter: Washable long-life net filter with mildew proof resin, unless otherwise indicated.
    6. Condensate Drainage: Built-in condensate drain pan with PVC drain connection.
        a. Units With Built-In Condensate Pumps: Provide condensate safety shutoff and alarm.
    7. Cabinet Insulation: Sound absorbing foamed polystyrene and polyethylene insulation.

B. Recessed Ceiling Units - 2 FT by 2 FT: Four-way airflow cassette with central return air grille, sized for installation in standard 24 by 24 inch (610 by 610 mm) lay-in ceiling grid.
    1. Cabinet Height: Maximum of 12 inches (305 mm) above face of ceiling.
    2. Exposed Housing: White, impact resistant, with washable decoration panel.
    3. Maintenance Access: All electrical components accessible through decoration panel.
    4. Supply Airflow Adjustment:
        a. Via motorized louvers which can be horizontally and vertically adjusted from 0 to 90 degrees.
        b. Field-modifiable to 3-way and 2-way airflow.
        c. Three auto-swing positions, including standard, draft prevention and ceiling stain prevention.
    5. Sound Pressure: Measured at low speed at 5 feet (1.5 m) below unit.
    6. Fan: Direct-drive turbo type.
    7. Condensate Pump: Built-in, with lift of 21 inches (533 mm), minimum.
    8. Provide side-mounted supply air branch duct connection.
    9. Provide side-mounted fresh air intake duct connection.

C. Concealed-In-Ceiling Units: Ducted horizontal discharge and return; galvanized steel cabinet.
    1. Return Air Filter: Manufacturer's standard.
    2. Sound Pressure: Measured at low speed at 5 feet (1.5 m) below unit.
    3. Provide external static pressure switch adjustable for high efficiency filter operation
    4. Condensate Pump: Built-in, with lift of 9 inches (229 mm), minimum.
    5. Switch box accessible from side or bottom.

D. Wall Surface-Mounted Units: Finished white casing, with removable front grille; foamed polystyrene and polyethylene sound insulation; wall mounting plate; polystyrene condensate drain pan.
   1. Airflow Control: Auto-swing louver that closes automatically when unit stops; five (5) steps of discharge angle, set using remote controller; upon restart, discharge angle defaulting to same angle as previous operation.
   2. Sound Pressure Range: Measured at low speed at 3.3 feet (1 m) below and away from unit.
   3. Condensate Drain Connection: Back, with piping concealed in wall.
   4. Fan: Direct-drive cross-flow type.

2.07 CONTROLS

A. Advanced Multi-zone Controllers The Daikin AC VRV advanced multi-zone controllers are compatible with all VRV, SkyAir, and Daikin RA and FTXS indoor units with the use of the KRP928BB2S RA Adapter. The advanced multi-zone controller wiring consist of a non-polar two-wire connection to the outdoor unit. The advanced multi-zone controllers may be wall-mounted and can be adjusted to maintain the optimal operation of up to 64 connected indoor unit groups and 128 indoor units. Set temperatures can be adjusted in increments of 1°F. In the cases where a system or unit error may occur, the VRV controllers will display a two-digit error code and the unit address.

B. The Daikin ITM shall have the Bacnet server license installed for expanded indoor and outdoor points.

C. Provide integration support for specified DDC system.

D. The intelligent Touch Manager (version 2.04) shall provide control for all VRV, SkyAir, and Daikin RA and FTXS indoor units with the use of the KRP928BB2S RA Adapter. It shall be capable of controlling a maximum or 64 indoor unit groups and 128 indoor units connected to a maximum of 10 outdoor units. The intelligent Touch Manager shall support operations superseding that of the local remote controller, system configuration, daily/weekly scheduling, monitoring of operation status, and malfunction monitoring.

E. The controller wiring shall consist of a non-polar two-wire connection to the indoor unit at terminals F1F2 (out-out) of the outdoor unit. The intelligent Touch Manager is wall mounted and can be adjusted to maintain the optimal operation of the connected indoor unit(s).

F. The intelligent Touch Manager can be used in conjunction with the BRC1E73 (Navigation Remote Controller), the BRC2A71 (Simplified Remote Controller), or the BRC4C82/7E83/7C812/7E818 (Wireless Remote Controller), BACnet interface, Lonworks interface, and Modbus adapter to control the same indoor unit groups. The remote controller shall require daisy chain wiring for grouping multiple indoor units (up to 16) together. Manual addressing is required of each remote controller group associated with the intelligent Touch Manager. DIII-NET address can be set for one (1) indoor unit or each indoor unit in the remote controller group. No more than 2 remote controllers can be placed in the same group.

G. The intelligent Touch Manager shall be equipped with two RJ-45 Ethernet ports for 100 Mbps network communication to support interconnection with a network PC via the Internet, Local Area Network (LAN), or connection with a non-networked PC after completed installation.

H. Web access functions shall be available so that facility staff can securely log into each Intelligent Touch Manager via the PC's web browser to support monitoring, scheduling, error recognition, and general user functions. Error emails are also sent to designated email addresses. An additional optional software function Power Proportional Distribution (PPD) tenant billing shall also be available. The optional software shall require advanced purchase and can only be activated upon receipt of a license activation key from Daikin AC.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install refrigerant piping in accordance with equipment manufacturer's instructions.

C. Perform wiring in accordance with NFPA 70, National Electric Code (NEC).

D. Coordinate with installers of systems and equipment connecting to this system.

3.02 FIELD QUALITY CONTROL

A. Provide manufacturer's field representative to inspect installation prior to startup.

3.03 SYSTEM STARTUP

A. Provide manufacturer's field representative to perform system startup.

B. Prepare and start equipment and system in accordance with manufacturer's instructions and recommendations.

C. Adjust equipment for proper operation within manufacturer's published tolerances.

3.04 CLEANING

A. Clean exposed components of dirt, finger marks, and other disfigurements.

3.05 CLOSEOUT ACTIVITIES

A. Demonstrate proper operation of equipment to Owner's designated representative.

B. Demonstration: Demonstrate operation of system to Owner's personnel.
   1. Use operation and maintenance data as reference during demonstration.
   2. Briefly describe function, operation, and maintenance of each component.

C. Training: Train Owner's personnel on operation and maintenance of system.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of one day of training.
   3. Instructor: Manufacturer's training personnel.
   4. Location: At project site.

3.06 PROTECTION

A. Protect installed components from subsequent construction operations.

B. Replace exposed components broken or otherwise damaged beyond repair.

END OF SECTION

SECTION 26 05 19

LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Single conductor building wire.

B. Underground feeder and branch-circuit cable.

C. Service entrance cable.

D. Metal-clad cable.

E. Wiring connectors.

F. Electrical tape.

G. Wire pulling lubricant.

H. Cable ties.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 26 05 26 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

D. Section 28 46 00 - Fire Detection and Alarm: Fire alarm system conductors and cables.

1.03 REFERENCE STANDARDS

A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire; 2013.

B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft; 2011 (Reapproved 2017).

C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes; 2010 (Reapproved 2014).

D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation; 2004 (Reapproved 2014).

E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape; 2017.

F. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

G. NECA 120 - Standard for Installing Armored Cable (AC) and Metal-Clad Cable (MC); 2012.

H. NECA 121 - Standard for Installing Nonmetallic-Sheathed Cable (Type NM-B) and Underground Feeder and Branch-Circuit Cable (Type UF); 2007.

I. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy; 2009.

J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 44 - Thermoset-Insulated Wires and Cables; Current Edition, Including All Revisions.

L. UL 83 - Thermoplastic-Insulated Wires and Cables; Current Edition, Including All Revisions.

M. UL 486A-486B - Wire Connectors; Current Edition, Including All Revisions.

N. UL 486C - Splicing Wire Connectors; Current Edition, Including All Revisions.

O. UL 486D - Sealed Wire Connector Systems; Current Edition, Including All Revisions.

P. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables; Current Edition, Including All Revisions.

Q. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape; Current Edition, Including All Revisions.

R. UL 1569 - Metal-Clad Cables; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.

PART 2 PRODUCTS

2.01 CONDUCTOR AND CABLE APPLICATIONS

A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.

B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.

C. Nonmetallic-sheathed cable is not permitted.

2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS

A. Provide products that comply with requirements of NFPA 70.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.

D. Comply with NEMA WC 70.

E. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.

F. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.

G. Conductor Material:
   1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
   2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
   3. Tinned Copper Conductors: Comply with ASTM B33.

H. Minimum Conductor Size:
   1. Branch Circuits: 12 AWG.
      a. Exceptions:
         1) 20 A, 120 V circuits longer than 75 feet (23 m): 10 AWG, for voltage drop.
         2) 20 A, 120 V circuits longer than 150 feet (46 m): 8 AWG, for voltage drop.
         3) 20 A, 277 V circuits longer than 150 feet (46 m): 10 AWG, for voltage drop.

I. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

J. Conductor Color Coding:
   1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
   2. Color Coding Method: Integrally colored insulation.
   3. Color Code:

a. 208Y/120 V, 3 Phase, 4 Wire System:
   1) Phase A: Black.
   2) Phase B: Red.
   3) Phase C: Blue.
   4) Neutral/Grounded: White.
b. Equipment Ground, All Systems: Green.

2.03 SINGLE CONDUCTOR BUILDING WIRE

A. Manufacturers:
   1. Copper Building Wire:
      a. Cerro Wire LLC: www.cerrowire.com.
      b. Encore Wire Corporation: www.encorewire.com.
      c. General Cable Technologies Corporation; www.generalcable.com.
      d. Southwire Company: www.southwire.com.

B. Description: Single conductor insulated wire.

C. Conductor Stranding:
   1. Feeders and Branch Circuits:
      a. Size 10 AWG and Smaller: Solid.
      b. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation:
   1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.
      a. Size 4 AWG and Larger: Type XHHW-2.
      b. Installed Underground: Type XHHW-2.

2.04 UNDERGROUND FEEDER AND BRANCH-CIRCUIT CABLE

A. Manufacturers:

B. Description: NFPA 70, Type UF multiple-conductor cable listed and labeled as complying with UL 493, Type UF-B.

C. Provide equipment grounding conductor unless otherwise indicated.

D. Conductor Stranding:
   1. Size 10 AWG and Smaller: Solid.
   2. Size 8 AWG and Larger: Stranded.

E. Insulation Voltage Rating: 600 V.

2.05 SERVICE ENTRANCE CABLE

A. Manufacturers:
   1. Copper Service Entrance Cable:
      a. Cerro Wire LLC: www.cerrowire.com.
      b. Encore Wire Corporation: www.encorewire.com.
      c. Southwire Company: www.southwire.com.

B. Conductor Stranding: Stranded.

C. Insulation Voltage Rating: 600 V.

2.06 METAL-CLAD CABLE

A. Manufacturers:
   1. AFC Cable Systems Inc: www.afcweb.com.
   2. Encore Wire Corporation: www.encorewire.com.
   3. Southwire Company: www.southwire.com.

B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.

C. Conductor Stranding:
   1. Size 10 AWG and Smaller: Solid.
   2. Size 8 AWG and Larger: Stranded.

D. Insulation Voltage Rating: 600 V.

E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.

F. Grounding: Full-size integral equipment grounding conductor.

G. Armor: Steel, interlocked tape.

2.07 WIRING CONNECTORS

A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.

B. Connectors for Grounding and Bonding: Comply with Section 26 05 26.

C. Wiring Connectors for Splices and Taps:
   1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
   2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.

D. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F (105 degrees C) for standard applications and 302 degrees F (150 degrees C) for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.

E. Mechanical Connectors: Provide bolted type or set-screw type.

F. Compression Connectors: Provide circumferential type or hex type crimp configuration.

2.08 WIRING ACCESSORIES

A. Electrical Tape:
   1. Manufacturers:
      a. 3M: www.3m.com.
   2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F (105 degrees C).
   3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil (0.18 mm); resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F (-18 degrees C) and suitable for continuous temperature environment up to 221 degrees F (105 degrees C).

B. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.

C. Cable Ties: Material and tensile strength rating suitable for application.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that interior of building has been protected from weather.

B. Verify that work likely to damage wire and cable has been completed.

C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.

D. Verify that field measurements are as indicated.

E. Verify that conditions are satisfactory for installation prior to starting work.

3.02 INSTALLATION

A. Circuiting Requirements:
   1. Common Neutrals: Unless otherwise indicated, sharing of neutral/grounded conductors among up to three single phase branch circuits of different phases installed in the same raceway is not permitted. Provide dedicated neutral/grounded conductor for each individual branch circuit.

B. Install products in accordance with manufacturer's instructions.

C. Perform work in accordance with NECA 1 (general workmanship).

D. Install underground feeder and branch-circuit cable (Type UF-B) in accordance with NECA 121.

E. Install metal-clad cable (Type MC) in accordance with NECA 120. MC cable will only be allowed for the following applications:
   1. 5' light fixture whips.
   2. Concealled in walls for general receptacles.

F. Installation in Raceway:
   1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
   2. Pull all conductors and cables together into raceway at same time.
   3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
   4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.

G. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.

H. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.

I. Terminate cables using suitable fittings.
   1. Metal-Clad Cable (Type MC):
      a. Use listed fittings.
      b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.

J. Install conductors with a minimum of 12 inches (300 mm) of slack at each outlet.

K. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.

L. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.

M. Make wiring connections using specified wiring connectors.
   1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
   2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
   3. Do not remove conductor strands to facilitate insertion into connector.
   4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminates. Do not use wire brush on plated connector surfaces.
   5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

N. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.

O. Insulate ends of spare conductors using vinyl insulating electrical tape.

P. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

Q. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

END OF SECTION

SECTION 26 05 26

GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Grounding and bonding requirements.

B. Conductors for grounding and bonding.

C. Connectors for grounding and bonding.

D. Ground bars.

E. Ground rod electrodes.

1.02 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.

B. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

1.03 REFERENCE STANDARDS

A. IEEE 81 - IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System; 2012.

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

C. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings; 2007.

D. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.

E. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

F. UL 467 - Grounding and Bonding Equipment; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.

PART 2 PRODUCTS

2.01 GROUNDING AND BONDING REQUIREMENTS

A. Do not use products for applications other than as permitted by NFPA 70 and product listing.

B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.

C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

D. Grounding System Resistance:

1. Achieve specified grounding system resistance under normally dry conditions unless otherwise approved by Architect. Precipitation within the previous 48 hours does not constitute normally dry conditions.
2. Grounding Electrode System: Not greater than 5 ohms to ground, when tested according to IEEE 81 using "fall-of-potential" method.

E. Grounding Electrode System:

1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
    a. Provide continuous grounding electrode conductors without splice or joint.
    b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
2. Metal Underground Water Pipe(s):
    a. Provide connection to underground metal domestic and fire protection (where present) water service pipe(s) that are in direct contact with earth for at least 10 feet (3.0 m) at an accessible location not more than 5 feet (1.5 m) from the point of entrance to the building.
    b. Provide bonding jumper(s) around insulating joints/pipes as required to make pipe electrically continuous.
    c. Provide bonding jumper around water meter of sufficient length to permit removal of meter without disconnecting jumper.
3. Metal In-Ground Support Structure:
    a. Provide connection to metal in-ground support structure that is in direct contact with earth in accordance with NFPA 70.
4. Concrete-Encased Electrode:
    a. Provide connection to concrete-encased electrode consisting of not less than 20 feet (6.0 m) of either steel reinforcing bars or bare copper conductor not smaller than 4 AWG embedded within concrete foundation or footing that is in direct contact with earth in accordance with NFPA 70.
5. Ground Rod Electrode(s):
    a. Provide three electrodes in an equilateral triangle configuration unless otherwise indicated or required.
    b. Space electrodes not less than 10 feet (3.0 m) from each other and any other ground electrode.
6. Provide additional ground electrode(s) as required to achieve specified grounding electrode system resistance.
7. Ground Bar: Provide ground bar, separate from service equipment enclosure, for common connection point of grounding electrode system bonding jumpers as permitted in NFPA 70. Connect grounding electrode conductor provided for service-supplied system grounding to this ground bar.
    a. Ground Bar Size: 1/4 by 2 by 12 inches (6 by 50 by 300 mm) unless otherwise indicated or required.
8. Ground Riser: Provide common grounding electrode conductor not less than 3/0 AWG for tap connections to multiple separately derived systems as permitted in NFPA 70.

F. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.

6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.

G. Communications Systems Grounding and Bonding:
   1. Provide intersystem bonding termination at service equipment or metering equipment enclosure and at disconnecting means for any additional buildings or structures in accordance with NFPA 70.
   2. Provide bonding jumper in raceway from intersystem bonding termination to each communications room or backboard and provide ground bar for termination.
      a. Bonding Jumper Size: 6 AWG, unless otherwise indicated or required.
      b. Raceway Size: 3/4 inch (21 mm) trade size unless otherwise indicated or required.
      c. Ground Bar Size: 1/4 by 2 by 12 inches (6 by 50 by 300 mm) unless otherwise indicated or required.

2.02 GROUNDING AND BONDING COMPONENTS

A. General Requirements:
   1. Provide products listed, classified, and labeled as suitable for the purpose intended.
   2. Provide products listed and labeled as complying with UL 467 where applicable.

B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 26 05 26:
   1. Use insulated copper conductors unless otherwise indicated.
      a. Exceptions:
         1) Use bare copper conductors where installed underground in direct contact with earth.
         2) Use bare copper conductors where directly encased in concrete (not in raceway).

C. Connectors for Grounding and Bonding:
   1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
   2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
   3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.

D. Ground Bars:
   1. Description: Copper rectangular ground bars with mounting brackets and insulators.
   2. Size: As indicated.
   3. Holes for Connections: As indicated or as required for connections to be made.
   4. Manufacturers:
      a. Advanced Lightning Technology (ALT); www.altfab.com.
      b. Erico International Corporation; www.erico.com.
      c. Harger Lightning & Grounding; www.harger.com.
      d. thermOweld, subsidiary of Continental Industries; division of Burndy LLC; www.thermoweld.com.

E. Ground Rod Electrodes:
   1. Comply with NEMA GR 1.
   2. Material: Copper-bonded (copper-clad) steel.
   3. Size: 3/4 inch (19 mm) diameter by 10 feet (3.0 m) length, unless otherwise indicated.
   4. Where rod lengths of greater than 10 feet (3.0 m) are indicated or otherwise required, sectionalized ground rods may be used.
   5. Manufacturers:
      a. Advanced Lightning Technology (ALT); www.altfab.com.
      b. Erico International Corporation; www.erico.com.
      c. Galvan Industries, Inc; www.galvanelectrical.com.
      d. Harger Lightning & Grounding; www.harger.com.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.

D. Make grounding and bonding connections using specified connectors.
   1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
   2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
   3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
   4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
   5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.

E. Identify grounding and bonding system components in accordance with Section 26 05 53.

3.02 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS except Section 4.

C. Perform inspections and tests listed in NETA ATS, Section 7.13.

D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.

E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

END OF SECTION

SECTION 26 05 29

HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, conduit, cable, boxes, and other electrical work.

1.02 RELATED REQUIREMENTS

A. Section 26 05 33.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.

B. Section 26 05 33.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

C. Section 26 51 00 - Interior Lighting: Additional support and attachment requirements for interior luminaires.

D. Section 26 56 00 - Exterior Lighting: Additional support and attachment requirements for exterior luminaires.

1.03 REFERENCE STANDARDS

A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2017.

B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.

C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel; 2015.

D. MFMA-4 - Metal Framing Standards Publication; 2004.

E. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.

1.05 QUALITY ASSURANCE

A. Comply with NFPA 70.

B. Comply with applicable building code.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
   2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
   3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported. Include consideration for vibration, equipment operation, and shock loads where applicable.
   4. Do not use products for applications other than as permitted by NFPA 70 and product listing.

5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
2. Conduit Clamps: Bolted type unless otherwise indicated.
3. Manufacturers:
    a. Cooper Crouse-Hinds, a division of Eaton Corporation; www.cooperindustries.com/.
    b. Erico International Corporation; www.erico.com/.
    c. O-Z/Gedney, a brand of Emerson Electric Co; www.emerson.com/.
    d. Thomas & Betts Corporation; www.tnb.com/.

C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
1. Manufacturers:
    a. Cooper Crouse-Hinds, a division of Eaton Corporation; www.cooperindustries.com/.
    b. Erico International Corporation; www.erico.com/.
    c. O-Z/Gedney, a brand of Emerson Electric Co; www.emerson.com/.
    d. Thomas & Betts Corporation; www.tnb.com/.

D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Comply with MFMA-4.

E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
    a. Equipment Supports: 1/2 inch (13 mm) diameter.
    b. Busway Supports: 1/2 inch (13 mm) diameter.
    c. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch (6 mm) diameter.
    d. Single Conduit larger than 1 inch (27 mm) trade size: 3/8 inch (10 mm) diameter.
    e. Outlet Boxes: 1/4 inch (6 mm) diameter.

F. Non-Penetrating Rooftop Supports for Low-Slope Roofs: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
3. Mounting Height: Provide minimum clearance of 6 inches (150 mm) under supported component to top of roofing.
4. Manufacturers:
    a. Cooper B-Line, a division of Eaton Corporation; www.cooperindustries.com/.
    b. Erico International Corporation; www.erico.com/.
    c. PHP Systems/Design; www.phpsd.com/.
    d. Unistrut, a brand of Atkore International Inc: www.unistrut.com/.

G. Anchors and Fasteners:
1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.

D. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

E. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

G. Equipment Support and Attachment:
   1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
   2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
   3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
   4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.

H. Secure fasteners according to manufacturer's recommended torque settings.

I. Remove temporary supports.

END OF SECTION

SECTION 26 05 33.13

CONDUIT FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Intermediate metal conduit (IMC).

B. PVC-coated galvanized steel rigid metal conduit (RMC).

C. Electrical metallic tubing (EMT).

D. Rigid polyvinyl chloride (PVC) conduit.

E. Conduit fittings.

1.02 RELATED REQUIREMENTS

A. Section 07 84 00 - Firestopping.

B. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Metal clad cable (Type MC), armored cable (Type AC), and manufactured wiring systems, including uses permitted.

C. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

D. Section 26 05 29 - Hangers and Supports for Electrical Systems.

E. Section 26 05 33.16 - Boxes for Electrical Systems.

1.03 REFERENCE STANDARDS

A. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S); 2015.

B. ANSI C80.6 - American National Standard for Electrical Intermediate Metal Conduit (EIMC); 2005.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT); 2013.

E. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC); 2003.

F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

G. NEMA RN 1 - Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit; 2005 (Reaffirmed 2013).

H. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit; 2013.

I. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing; 2016.

J. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

K. UL 6 - Electrical Rigid Metal Conduit-Steel; Current Edition, Including All Revisions.

L. UL 514B - Conduit, Tubing, and Cable Fittings; Current Edition, Including All Revisions.

M. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings; Current Edition, Including All Revisions.

N. UL 797 - Electrical Metallic Tubing-Steel; Current Edition, Including All Revisions.

O. UL 1242 - Electrical Intermediate Metal Conduit-Steel; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.

1.05 QUALITY ASSURANCE

A. Conform to requirements of NFPA 70.

PART 2 PRODUCTS

2.01 CONDUIT APPLICATIONS

A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.

B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.

C. Underground:
   1. Under Slab on Grade: Use rigid PVC conduit.
   2. Exterior, Direct-Buried: Use rigid PVC conduit.
   3. Where rigid polyvinyl (PVC) conduit is provided, transition to intermediate metal conduit (IMC) where emerging from underground.
   4. Where rigid polyvinyl (PVC) conduit larger than 2 inch (53 mm) trade size is provided, use PVC-coated galvanized steel rigid metal conduit elbows for bends.
   5. Where steel conduit is installed in direct contact with earth where soil has a resistivity of less than 2000 ohm-centimeters or is characterized as severely corrosive based on soils report or local experience, use corrosion protection tape to provide supplementary corrosion protection or use PVC-coated galvanized steel rigid metal conduit.
   6. Where steel conduit emerges from concrete into soil, use corrosion protection tape to provide supplementary corrosion protection for a minimum of 4 inches (100 mm) on either side of where conduit emerges or use PVC-coated galvanized steel rigid metal conduit.

D. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT) or MC as allowed in section 26 05 19.

E. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).

F. Exposed, Interior, Not Subject to Physical Damage: Use electrical metallic tubing (EMT).

G. Exposed, Exterior: Use intermediate metal conduit (IMC).

H. Connections to Luminaires Above Accessible Ceilings: Use flexible metal conduit.
   1. Maximum Length: 5 feet.

I. Connections to Vibrating Equipment:
   1. Dry Locations: Use flexible metal conduit.
   2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
   3. Maximum Length: 6 feet (1.8 m) unless otherwise indicated.
   4. Vibrating equipment includes, but is not limited to:
      a. Motors.
      b. Pumps.

2.02 CONDUIT REQUIREMENTS

A. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Minimum Conduit Size, Unless Otherwise Indicated:
   1. Branch Circuits: 1/2 inch (16 mm) trade size.
   2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
   3. Control Circuits: 1/2 inch (16 mm) trade size.
   4. Flexible Connections to Luminaires: 3/8 inch (12 mm) trade size.

5. Underground, Interior: 3/4 inch (21 mm) trade size.
6. Underground, Exterior: 1 inch (27 mm) trade size.

D. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

2.03 INTERMEDIATE METAL CONDUIT (IMC)

A. Manufacturers:
1. Allied Tube & Conduit: www.alliedeg.com.
2. Republic Conduit: www.republic-conduit.com.
3. Wheatland Tube Company: www.wheatland.com.

B. Description: NFPA 70, Type IMC galvanized steel intermediate metal conduit complying with ANSI C80.6 and listed and labeled as complying with UL 1242.

C. Fittings:
1. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
2. Material: Use steel or malleable iron.
3. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

2.04 PVC-COATED GALVANIZED STEEL RIGID METAL CONDUIT (RMC)

A. Manufacturers:
1. Thomas & Betts Corporation; www.tnb.com.
2. Robroy Industries; www.robroy.com.

B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit with external polyvinyl chloride (PVC) coating complying with NEMA RN 1 and listed and labeled as complying with UL 6.

C. Exterior Coating: Polyvinyl chloride (PVC), nominal thickness of 40 mil (1.02 mm).

D. PVC-Coated Fittings:
1. Manufacturer: Same as manufacturer of PVC-coated conduit to be installed.
2. Non-Hazardous Locations: Use fittings listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.
4. Exterior Coating: Polyvinyl chloride (PVC), minimum thickness of 40 mil (1.02 mm).

E. PVC-Coated Supports: Furnish with exterior coating of polyvinyl chloride (PVC), minimum thickness of 15 mil (0.38 mm).

2.05 ELECTRICAL METALLIC TUBING (EMT)

A. Manufacturers:
1. Allied Tube & Conduit; www.alliedeg.com.
2. Republic Conduit: www.republic-conduit.com.
3. Wheatland Tube Company; www.wheatland.com.

B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.

C. Fittings:
1. Manufacturers:
a. Bridgeport Fittings Inc: www.bptfittings.com.
b. O-Z/Gedney, a brand of Emerson Electric Co: www.emerson.com.
c. Thomas & Betts Corporation: www.tnb.com.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel or malleable iron.

4. Connectors and Couplings: Use compression (gland) type.
    a. Do not use indenter type connectors and couplings.

2.06 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT

A. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.

B. Fittings:
1. Manufacturer: Same as manufacturer of conduit to be connected.
2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install intermediate metal conduit (IMC) in accordance with NECA 101.

D. Install PVC-coated galvanized steel rigid metal conduit (RMC) using only tools approved by the manufacturer.

E. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.

F. Install electrical nonmetallic tubing (ENT) in accordance with NECA 111.

G. Conduit Routing:
1. Unless dimensioned, conduit routing indicated is diagrammatic.
2. When conduit destination is indicated without specific routing, determine exact routing required.
3. Conceal all conduits unless specifically indicated to be exposed.
4. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
5. Arrange conduit to maintain adequate headroom, clearances, and access.
6. Arrange conduit to provide no more than 150 feet (46 m) between pull points.
7. Route conduits above water and drain piping where possible.
8. Maintain minimum clearance of 6 inches (150 mm) between conduits and piping for other systems.

H. Conduit Support:
1. Secure and support conduits in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
4. Use metal channel (strut) with accessory conduit clamps to support multiple parallel surface-mounted conduits.
5. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
6. Use non-penetrating rooftop supports to support conduits routed across rooftops (only where approved).

I. Connections and Terminations:

1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
3. Use suitable adapters where required to transition from one type of conduit to another.
4. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.
5. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
6. Secure joints and connections to provide maximum mechanical strength and electrical continuity.

J. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
2. Make penetrations perpendicular to surfaces unless otherwise indicated.
3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
4. Conceal bends for conduit risers emerging above ground.
5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
6. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
7. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
8. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

K. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
3. Where conduits are subject to earth movement by settlement or frost.

L. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.

M. Provide grounding and bonding in accordance with Section 26 05 26.

END OF SECTION

SECTION 26 05 33.16

BOXES FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Outlet and device boxes up to 100 cubic inches (1,650 cu cm), including those used as junction and pull boxes.

B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches (1,650 cu cm).

C. Floor boxes.

D. Underground boxes/enclosures.

1.02 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 05 33.13 - Conduit for Electrical Systems:
   1. Conduit bodies and other fittings.

D. Section 26 27 26 - Wiring Devices:
   1. Wall plates.
   2. Floor box service fittings.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable; 2014.

D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports; 2013.

E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. SCTE 77 - Specification for Underground Enclosure Integrity; 2017.

H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

J. UL 508A - Industrial Control Panels; 2013.

K. UL 514A - Metallic Outlet Boxes; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for cabinets and enclosures, boxes for hazardous (classified) locations, floor boxes, and underground boxes/enclosures.

PART 2 PRODUCTS

2.01 BOXES

A. General Requirements:

1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
3. Provide products listed, classified, and labeled as suitable for the purpose intended.
4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
5. Provide grounding terminals within boxes where equipment grounding conductors terminate.

B. Outlet and Device Boxes Up to 100 cubic inches (1,650 cu cm), Including Those Used as Junction and Pull Boxes:
1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
3. Use suitable concrete type boxes where flush-mounted in concrete.
4. Use suitable masonry type boxes where flush-mounted in masonry walls.
5. Use raised covers suitable for the type of wall construction and device configuration where required.
6. Use shallow boxes where required by the type of wall construction.
7. Do not use "through-wall" boxes designed for access from both sides of wall.
8. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
9. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.
10. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
11. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
12. Minimum Box Size, Unless Otherwise Indicated:
    a. Communications Systems Outlets: 4 inch square by 2-1/8 inch (100 by 54 mm) trade size.
    b. Ceiling Outlets: 4 inch octagonal or square by 1-1/2 inch deep (100 by 38 mm) trade size.
13. Wall Plates: Comply with Section 26 27 26.

C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
2. NEMA 250 Environment Type, Unless Otherwise Indicated:
3. Junction and Pull Boxes Larger Than 100 cubic inches (1,650 cu cm):
    a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
4. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.

D. Floor Boxes:
1. Description: Floor boxes compatible with floor box service fittings provided in accordance with Section 26 27 26; with partitions to separate multiple services; furnished with all components, adapters, and trims required for complete installation.

E. Underground Boxes/Enclosures:
1. Description: In-ground, open bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel tamper resistant cover bolts.
2. Size: As indicated on drawings.
3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches (300 mm).
4. Applications:
    a. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.

5. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
   a. Manufacturers:
      1) Hubbell Incorporated; Quazite Products; www.hubbellpowersystems.com.
      2) MacLean Highline; www.macleanhighline.com.
      3) Oldcastle Precast, Inc; www.oldcastleprecast.com.
   b. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Box Supports:
   1. Secure and support boxes in accordance with NFPA 70 and Section 26 05 29 using suitable supports and methods approved by the authority having jurisdiction.
   2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.

E. Install boxes plumb and level.

F. Flush-Mounted Boxes:
   1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch (6 mm) or does not project beyond finished surface.
   2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
   3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch (3 mm) at the edge of the box.

G. Install boxes as required to preserve insulation integrity.

H. Underground Boxes/Enclosures:
   1. Install enclosure on gravel base, minimum 6 inches (150 mm) deep.
   2. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.

I. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

J. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 07 84 00.

K. Close unused box openings.

L. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.

M. Provide grounding and bonding in accordance with Section 26 05 26.

END OF SECTION

SECTION 26 05 53

IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Electrical identification requirements.

B. Identification nameplates and labels.

C. Wire and cable markers.

D. Voltage markers.

E. Floor marking tape.

F. Warning signs and labels.

1.02 RELATED REQUIREMENTS

A. Section 26 05 19 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.

B. Section 26 27 26 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.

1.03 REFERENCE STANDARDS

A. ANSI Z535.2 - American National Standard for Environmental and Facility Safety Signs; 2011.

B. ANSI Z535.4 - American National Standard for Product Safety Signs and Labels; 2011.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 969 - Marking and Labeling Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements for submittals procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.

PART 2 PRODUCTS

2.01 IDENTIFICATION REQUIREMENTS

A. Identification for Equipment:
   1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
      a. Switchgear:
         1) Identify voltage and phase.
         2) Identify power source and circuit number. Include location when not within sight of equipment.
         3) Use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.
      b. Panelboards:
         1) Identify voltage and phase.
         2) Identify power source and circuit number. Include location when not within sight of equipment.
         3) Use typewritten circuit directory to identify load(s) served for panelboards with a door. Identify spares and spaces using pencil.
         4) For power panelboards without a door, use identification nameplate to identify load(s) served for each branch device. Do not identify spares and spaces.

c. Enclosed switches, circuit breakers, and motor controllers:
1) Identify voltage and phase.
d. Enclosed Contactors:
1) Identify ampere rating.
2) Identify voltage and phase.
3) Identify configuration, e.g., E.O.E.H. (electrically operated, electrically held) or E.O.M.H. (electrically operated, mechanically held).
4) Identify coil voltage.

2. Service Equipment:
a. Use identification nameplate to identify each service disconnecting means.
3. Available Fault Current Documentation: Use identification label to identify the available fault current and date calculations were performed at locations requiring documentation by NFPA 70, including but not limited to the following.
a. Service equipment.
b. Industrial control panels.
c. Motor control centers.
d. Elevator control panels.
e. Industrial machinery.

B. Identification for Conductors and Cables:
1. Color Coding for Power Conductors 600 V and Less: Comply with Section 26 05 19.
2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.

C. Identification for Devices:
1. Wiring Device and Wallplate Finishes: Comply with Section 26 27 26.

2.02 IDENTIFICATION NAMEPLATES AND LABELS

A. Identification Nameplates:
1. Manufacturers:
a. Brimar Industries, Inc: www.brimar.com.
b. Kolbi Pipe Marker Co; www.kolbipipemarkers.com.
c. Seton Identification Products; www.seton.com.
2. Materials:
a. Indoor Clean, Dry Locations: Use plastic nameplates.
b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
3. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch (1.6 mm); engraved text.
4. Stainless Steel Nameplates: Minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
5. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch (0.8 mm); engraved or laser-etched text.
6. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch (25 mm) high; Four, located at corners for larger sizes.

B. Identification Labels:
1. Manufacturers:
a. Brady Corporation; www.bradyid.com.
b. Brother International Corporation: www.brother-usa.com.
c. Panduit Corp: www.panduit.com.

2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.

C. Format for Equipment Identification:
1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
2. Legend:
a. System designation where applicable:
1) Fire Alarm System: Identify with text "FIRE ALARM".
b. Equipment designation or other approved description.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height:
a. System Designation: 1 inch (25 mm).
b. Equipment Designation: 1/2 inch (13 mm).
5. Color:
a. Normal Power System: White text on black background.
b. Fire Alarm System: White text on red background.

D. Format for General Information and Operating Instructions:
1. Minimum Size: 1 inch (25 mm) by 2.5 inches (64 mm).
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/4 inch (6 mm).
5. Color: Black text on white background unless otherwise indicated.

E. Format for Caution and Warning Messages:
1. Minimum Size: 2 inches (51 mm) by 4 inches (100 mm).
2. Legend: Include information or instructions indicated or as required for proper and safe operation and maintenance.
3. Text: All capitalized unless otherwise indicated.
4. Minimum Text Height: 1/2 inch (13 mm).
5. Color: Black text on yellow background unless otherwise indicated.

2.03 WIRE AND CABLE MARKERS

A. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl self-laminating type markers suitable for the conductor or cable to be identified.

B. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.

C. Legend: Power source and circuit number or other designation indicated.

D. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.

E. Minimum Text Height: 1/8 inch (3 mm).

F. Color: Black text on white background unless otherwise indicated.

2.04 VOLTAGE MARKERS

A. Manufacturers:
1. Brady Corporation; www.bradyid.com.
2. Brimar Industries, Inc: www.brimar.com.
3. Seton Identification Products; www.seton.com.

B. Minimum Size:

C. Legend:

D. Color: Black text on orange background unless otherwise indicated.

2.05 FLOOR MARKING TAPE

A. Manufacturers:
   1. Brady Corporation; www.bradyid.com.
   2. Brimar Industries, Inc: www.brimar.com.
   3. Seton Identification Products; www.seton.com.

B. Floor Marking Tape for Equipment Working Clearance Identification: Self-adhesive vinyl or polyester tape with overlaminate, 3 inches (76 mm) wide, with alternating black and white stripes.

2.06 WARNING SIGNS AND LABELS

A. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.

B. Warning Signs:
   1. Materials:
   2. Minimum Size: 7 by 10 inches (178 by 254 mm) unless otherwise indicated.

C. Warning Labels:
   1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
   2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
   3. Minimum Size: 2 by 4 inches (51 mm by 102 mm) unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
   1. Surface-Mounted Equipment: Enclosure front.
   2. Flush-Mounted Equipment: Inside of equipment door.
   3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
   4. Elevated Equipment: Legible from the floor or working platform.
   5. Branch Devices: Adjacent to device.
   6. Interior Components: Legible from the point of access.
   7. Conductors and Cables: Legible from the point of access.
   8. Devices: Outside face of cover.

C. Install identification products centered, level, and parallel with lines of item being identified.

D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.

E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.

F. Mark all handwritten text, where permitted, to be neat and legible.

END OF SECTION

SECTION 26 09 19

ENCLOSED CONTACTORS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Lighting contactors.

1.02 RELATED REQUIREMENTS

A. Section 26 05 29 - Hangers and Supports for Electrical Systems.

1.03 REFERENCE STANDARDS

A. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts; 2000, with Errata (2008).

B. NEMA ICS 6 - Industrial Control and Systems: Enclosures; 1993 (Reaffirmed 2016).

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide dimensions, size, voltage ratings and current ratings.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. General Electric Company; www.geindustrial.com.

B. Schneider Electric; Square D Products; www.schneider-electric.us.

2.02 LIGHTING CONTACTORS

A. Description: NEMA ICS 2, magnetic lighting contactor.

B. Configuration: Electrically held.

C. Coil operating voltage: 120 volts, 60 Hertz.

D. Poles: As required to match circuit configuration and control function.

E. Contact Rating: Match branch circuit overcurrent protection, considering derating for continuous loads.

F. Enclosure: NEMA ICS 6, Type 1.

G. Accessories:
   1. Pushbutton: ON/OFF.
   2. Selector Switch: ON/OFF.
   3. Indicating Light: RED.
   4. Auxiliary Contacts: One, normally open.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install enclosed contactors where indicated, in accordance with manufacturer's instructions.

B. Install enclosed contactors plumb. Provide supports in accordance with Section 26 05 29.

C. Height: 5 ft (1500 mm) to operating handle.

END OF SECTION

SECTION 26 09 23

LIGHTING CONTROL DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Occupancy sensors.

1.02 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 05 33.16 - Boxes for Electrical Systems.

D. Section 26 27 26 - Wiring Devices: Devices for manual control of lighting, including wall switches, wall dimmers, and fan speed controllers.

E. Section 26 51 00 - Interior Lighting.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Include ratings, configurations, standard wiring diagrams, dimensions, colors, service condition requirements, and installed features.
   1. Occupancy Sensors: Include detailed motion detection coverage range diagrams.

C. Field Quality Control Reports.

1.05 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide five year manufacturer warranty for all occupancy sensors.

PART 2 PRODUCTS

2.01 LIGHTING CONTROL DEVICES - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless specifically indicated to be excluded, provide all required conduit, wiring, connectors, hardware, components, accessories, etc. as required for a complete operating system.

2.02 OCCUPANCY SENSORS

A. Manufacturers:
   1. Hubbell Incorporated; www.hubbell.com.
   2. WattStopper; www.wattstopper.com.

B. All Occupancy Sensors:
   1. Description: Factory-assembled commercial specification grade devices for indoor use capable of sensing both major motion, such as walking, and minor motion, such as small desktop level movements, according to published coverage areas, for automatic control of load indicated.
   2. Sensor Technology:

a. Passive Infrared/Ultrasonic Dual Technology Occupancy Sensors: Designed to detect occupancy using a combination of both passive infrared and ultrasonic technologies.

3. Provide LED to visually indicate motion detection with separate color LEDs for each sensor type in dual technology units.
4. Operation: Unless otherwise indicated, occupancy sensor to turn load on when occupant presence is detected and to turn load off when no occupant presence is detected during an adjustable turn-off delay time interval.
5. Dual Technology Occupancy Sensors: Field configurable turn-on and hold-on activation with settings for activation by either or both sensing technologies.
6. Turn-Off Delay: Field adjustable, with time delay settings up to 30 minutes.
7. Compatibility (Non-Dimming Sensors): Suitable for controlling incandescent lighting, low-voltage lighting with electronic and magnetic transformers, fluorescent lighting with electronic and magnetic ballasts, and fractional motor loads, with no minimum load requirements.

C. Wall Switch Occupancy Sensors:
1. All Wall Switch Occupancy Sensors:
a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated manual control capability, and no leakage current to load in off mode.
b. Manual-Off Override Control: When used to turn off load while in automatic-on mode, unit to revert back to automatic mode after no occupant presence is detected during the delayed-off time interval.

D. Wall Dimmer Occupancy Sensors:
1. General Requirements:
a. Description: Occupancy sensors designed for installation in standard wall box at standard wall switch mounting height with a field of view of 180 degrees, integrated dimming control capability , and no leakage current to load in off mode.
b. Dimmer: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, and listed as complying with UL 1472; type and rating suitable for load controlled.

E. Ceiling Mounted Occupancy Sensors:
1. All Ceiling Mounted Occupancy Sensors:
a. Description: Low profile occupancy sensors designed for ceiling installation.
b. Unless otherwise indicated or required to control the load indicated on drawings, provide low voltage units, for use with separate compatible accessory power packs.
c. Finish: White unless otherwise indicated.
2. Passive Infrared/Ultrasonic Dual Technology Ceiling Mounted Occupancy Sensors:

PART 3 EXECUTION

3.01 INSTALLATION

A. Install lighting control devices in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of lighting control devices provided under this section.
1. Orient outlet boxes for vertical installation of lighting control devices unless otherwise indicated.

C. Install lighting control devices in accordance with manufacturer's instructions.

D. Unless otherwise indicated, connect lighting control device grounding terminal or conductor to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

E. Install lighting control devices plumb and level, and held securely in place.

F. Where required and not furnished with lighting control device, provide wall plate in accordance with Section 26 27 26.

G. Provide required supports in accordance with Section 26 05 29.

H. Where applicable, install lighting control devices and associated wall plates to fit completely flush to mounting surface with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

I. Occupancy Sensor Locations:
   1. Locate ultrasonic and dual technology passive infrared/ultrasonic occupancy sensors a minimum of 4 feet (1.2 m) from air supply ducts or other sources of heavy air flow and as per manufacturer's recommendations, in order to minimize false triggers.

3.02 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each lighting control device for damage and defects.

C. Test occupancy sensors to verify proper operation, including time delays and ambient light thresholds where applicable. Verify optimal coverage for entire room or area. Record test results in written report to be included with submittals.

D. Correct wiring deficiencies and replace damaged or defective lighting control devices.

3.03 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust occupancy sensor settings to minimize undesired activations while optimizing energy savings, and to achieve desired function as indicated or as directed by Architect.

C. Adjust position of directional occupancy sensors to achieve optimal coverage as required.

D. Where indicated or as directed by Architect, install factory masking material or adjust integral blinders on passive infrared (PIR) and dual technology occupancy sensor lenses to block undesired motion detection.

3.04 CLOSEOUT ACTIVITIES

A. Training: Train Owner's personnel on operation, adjustment, programming, and maintenance of lighting control devices.
   1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
   2. Provide minimum of two hours of training.

END OF SECTION

SECTION 26 24 16

PANELBOARDS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Power distribution panelboards.

B. Lighting and appliance panelboards.

C. Overcurrent protective devices for panelboards.

1.02 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 43 00 - Surge Protective Devices.

1.03 REFERENCE STANDARDS

A. FS W-C-375 - Circuit Breakers, Molded Case; Branch Circuit and Service; 2013e (Amended 2017).

B. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

C. NECA 407 - Standard for Installing and Maintaining Panelboards; 2015.

D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

E. NEMA PB 1 - Panelboards; 2011.

F. NEMA PB 1.1 - General Instructions for Proper Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less; 2013.

G. NETA ATS - Acceptance Testing Specifications for Electrical Power Equipment and Systems; 2017.

H. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

I. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations; Current Edition, Including All Revisions.

J. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations; Current Edition, Including All Revisions.

K. UL 67 - Panelboards; Current Edition, Including All Revisions.

L. UL 489 - Molded-Case Circuit Breakers, Molded-Case Switches and Circuit Breaker Enclosures; Current Edition, Including All Revisions.

M. UL 869A - Reference Standard for Service Equipment; Current Edition, Including All Revisions.

N. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for panelboards, enclosures, overcurrent protective devices, and other installed components and accessories.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ABB/GE; www.geindustrial.com.

B. Schneider Electric; Square D Products; www.schneider-electric.us.

2.02 PANELBOARDS - GENERAL REQUIREMENTS

A. Provide products listed, classified, and labeled as suitable for the purpose intended.

B. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:
   1. Altitude: Less than 6,600 feet (2,000 m).
   2. Ambient Temperature:
      a. Panelboards Containing Circuit Breakers: Between 23 degrees F (-5 degrees C) and 104 degrees F (40 degrees C).

C. Short Circuit Current Rating:
   1. Provide panelboards with listed short circuit current rating as indicated on the drawings.

D. Panelboards Used for Service Entrance: Listed and labeled as suitable for use as service equipment according to UL 869A.

E. Mains: Configure for top or bottom incoming feed as indicated or as required for the installation.

F. Branch Overcurrent Protective Devices: Replaceable without disturbing adjacent devices.

G. Bussing: Sized in accordance with UL 67 temperature rise requirements.
   1. Provide solidly bonded equipment ground bus in each panelboard, with a suitable lug for each feeder and branch circuit equipment grounding conductor.

H. Conductor Terminations: Suitable for use with the conductors to be installed.

I. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.
   1. Environment Type per NEMA 250: As indicated on the drawings.
   2. Boxes: Galvanized steel unless otherwise indicated.
      a. Provide wiring gutters sized to accommodate the conductors to be installed.
   3. Fronts:
      a. Fronts for Surface-Mounted Enclosures: Same dimensions as boxes.
      b. Fronts for Flush-Mounted Enclosures: Overlap boxes on all sides to conceal rough opening.
   4. Lockable Doors: All locks keyed alike unless otherwise indicated.

J. Future Provisions: Prepare all unused spaces for future installation of devices including bussing, connectors, mounting hardware and all other required provisions.

K. Surge Protective Devices: Where factory-installed, internally mounted surge protective devices are provided in accordance with Section 26 43 00, list and label panelboards as a complete assembly including surge protective device.

2.03 POWER DISTRIBUTION PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, power and feeder distribution type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
   1. Phase and Neutral Bus Material: Aluminum.
   2. Ground Bus Material: Aluminum.

D. Circuit Breakers:
   1. Provide bolt-on type or plug-in type secured with locking mechanical restraints.

E. Enclosures:

1. Provide surface-mounted enclosures unless otherwise indicated.

2.04 LIGHTING AND APPLIANCE PANELBOARDS

A. Description: Panelboards complying with NEMA PB 1, lighting and appliance branch circuit type, circuit breaker type, and listed and labeled as complying with UL 67; ratings, configurations and features as indicated on the drawings.

B. Conductor Terminations:
   1. Main and Neutral Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   2. Main and Neutral Lug Type: Mechanical.

C. Bussing:
   1. Phase Bus Connections: Arranged for sequential phasing of overcurrent protective devices.
   2. Phase and Neutral Bus Material: Aluminum.
   3. Ground Bus Material: Aluminum.

D. Circuit Breakers: Thermal magnetic bolt-on type unless otherwise indicated.

E. Enclosures:
   1. Provide surface-mounted or flush-mounted enclosures as indicated.
   2. Provide clear plastic circuit directory holder mounted on inside of door.

2.05 OVERCURRENT PROTECTIVE DEVICES

A. Molded Case Circuit Breakers:
   1. Description: Quick-make, quick-break, over center toggle, trip-free, trip-indicating circuit breakers listed and labeled as complying with UL 489, and complying with FS W-C-375 where applicable; ratings, configurations, and features as indicated on the drawings.
   2. Interrupting Capacity:
      a. Provide circuit breakers with interrupting capacity as required to provide the short circuit current rating indicated, but not less than:
      b. Fully Rated Systems: Provide circuit breakers with interrupting capacity not less than the short circuit current rating indicated.
   3. Conductor Terminations:
      a. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.
   4. Thermal Magnetic Circuit Breakers: For each pole, furnish thermal inverse time tripping element for overload protection and magnetic instantaneous tripping element for short circuit protection.
   5. Multi-Pole Circuit Breakers: Furnish with common trip for all poles.
   6. Provide the following circuit breaker types where indicated:
      a. Ground Fault Circuit Interrupter (GFCI) Circuit Breakers: Listed as complying with UL 943, class A for protection of personnel.
      b. 100 Percent Rated Circuit Breakers: Listed for application within the panelboard where installed at 100 percent of the continuous current rating.

PART 3 EXECUTION

3.01 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Install panelboards in accordance with NECA 407 and NEMA PB 1.1.

D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

E. Provide required supports in accordance with Section 26 05 29.

F. Install panelboards plumb.

G. Install flush-mounted panelboards so that trims fit completely flush to wall with no gaps and rough opening completely covered.

H. Mount panelboards such that the highest position of any operating handle for circuit breakers or switches does not exceed 79 inches (2000 mm) above the floor or working platform.

I. Provide minimum of six spare 1 inch (27 mm) trade size conduits out of each flush-mounted panelboard stubbed into accessible space above ceiling and below floor.

J. Provide grounding and bonding in accordance with Section 26 05 26.

K. Install all field-installed branch devices, components, and accessories.

L. Provide filler plates to cover unused spaces in panelboards.

3.02 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect and test in accordance with NETA ATS, except Section 4.

C. Molded Case Circuit Breakers: Perform inspections and tests listed in NETA ATS, Section 7.6.1.1 for all main circuit breakers and circuit breakers larger than 20 amperes. Tests listed as optional are not required.

D. Test GFCI circuit breakers to verify proper operation.

E. Correct deficiencies and replace damaged or defective panelboards or associated components.

3.03 ADJUSTING

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

B. Adjust alignment of panelboard fronts.

3.04 CLEANING

A. Clean dirt and debris from panelboard enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 27 26

WIRING DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Wall switches.

B. Wall dimmers.

C. Receptacles.

D. Wall plates.

E. Floor box service fittings.

1.02 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 33.16 - Boxes for Electrical Systems.

C. Section 26 09 23 - Lighting Control Devices: Devices for automatic control of lighting, including occupancy sensors, in-wall time switches, and in-wall interval timers.

1.03 REFERENCE STANDARDS

A. FS W-C-596 - Connector, Electrical, Power, General Specification for; 2017h.

B. FS W-S-896 - Switches, Toggle (Toggle and Lock), Flush-mounted (General Specification); 2017g.

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

D. NECA 130 - Standard for Installing and Maintaining Wiring Devices; 2010.

E. NEMA WD 1 - General Color Requirements for Wiring Devices; 1999 (Reaffirmed 2015).

F. NEMA WD 6 - Wiring Devices - Dimensional Specifications; 2016.

G. UL 20 - General-Use Snap Switches; Current Edition, Including All Revisions.

H. UL 498 - Attachment Plugs and Receptacles; Current Edition, Including All Revisions.

I. UL 514D - Cover Plates for Flush-Mounted Wiring Devices; Current Edition, Including All Revisions.

J. UL 943 - Ground-Fault Circuit-Interrupters; Current Edition, Including All Revisions.

K. UL 1472 - Solid-State Dimming Controls; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
   1. Wall Dimmers: Include derating information for ganged multiple devices.

PART 2 PRODUCTS

2.01 WIRING DEVICE APPLICATIONS

A. Provide wiring devices suitable for intended use and with ratings adequate for load served.

B. For single receptacles installed on an individual branch circuit, provide receptacle with ampere rating not less than that of the branch circuit.

2.02 WALL SWITCHES

A. Manufacturers:
   1. Lutron
   2. Hubbell Incorporated; www.hubbell.com.

3. Leviton Manufacturing Company, Inc; www.leviton.com.
4. Pass & Seymour, a brand of Legrand North America, Inc; www.legrand.us.

B. Wall Switches - General Requirements: AC only, quiet operating, general-use snap switches with silver alloy contacts, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 20 and where applicable, FS W-S-896; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring and screw actuated binding clamp for back wiring with separate ground terminal screw.

C. Standard Wall Switches: Industrial specification grade, 20 A, 120 V with standard toggle type switch actuator and maintained contacts; single pole single throw, double pole single throw, three way, or four way as indicated on the drawings.

2.03 WALL DIMMERS

A. Manufacturers:
   1. Wattstopper.
      a. Wall dimmers shall be Legrand Wattstopper RH4FBL3TC unless noted otherwise on the construction documents. Color selected by Architect.

B. Wall Dimmers - General Requirements: Solid-state with continuous full-range even control following square law dimming curve, integral radio frequency interference filtering, power failure preset memory, air gap switch accessible without removing wall plate, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 1472; types and ratings suitable for load controlled as indicated on the drawings.

C. Control: Slide control type with separate on/off switch.

D. Power Rating, Unless Otherwise Indicated or Required to Control the Load Indicated on the Drawings:

2.04 RECEPTACLES

A. Manufacturers:
   1. Hubbell Incorporated; www.hubbell.com.
   2. Leviton Manufacturing Company, Inc; www.leviton.com.
   3. Lutron Electronics Company, Inc; Designer Style: www.lutron.com.
   4. Pass & Seymour, a brand of Legrand North America, Inc; www.legrand.us.

B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
   1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
   2. NEMA configurations specified are according to NEMA WD 6.

C. Convenience Receptacles:
   1. Standard Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R; single or duplex as indicated on the drawings.
   2. Weather Resistant Convenience Receptacles: Industrial specification grade, 20A, 125V, NEMA 5-20R, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations; single or duplex as indicated on the drawings.

D. GFCI Receptacles:
   1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
   2. Standard GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style.

3. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.

2.05 WALL PLATES

A. Manufacturers:
   1. Hubbell Incorporated; www.hubbell-wiring.com.
   2. Leviton Manufacturing Company, Inc; www.leviton.com.
   3. Lutron Electronics Company, Inc; www.lutron.com.
   4. Pass & Seymour, a brand of Legrand North America, Inc; www.legrand.us.

B. Wall Plates: Comply with UL 514D.
   1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
   2. Size: Standard;
   3. Screws: Metal with slotted heads finished to match wall plate finish.

C. Stainless Steel Wall Plates: Brushed satin finish, Type 302 stainless steel.

2.06 FLOOR BOX SERVICE FITTINGS

A. Manufacturers:
   1. Hubbell Incorporated; www.hubbell.com.

B. Description: Service fittings compatible with floor boxes provided under Section 26 05 33.16 with components, adapters, and trims required for complete installation.

C. Flush Floor Service Fittings:
   1. Accessories:
      a. Tile Rings: Finish to match covers; configuration as required to accommodate specified covers.
      b. Carpet Flanges: Finish to match covers; configuration as required to accommodate specified covers.

D. Schedule:
   1. FB01: (2) Duplex Receptacles: Hubbell Model CFB4G30CI with 24GCCVR Cover (Color Selected by Architect). Provide blank plates as required.
   2. FB02: (2) Duplex Receptacles and (1) Data Port (Coordinate Quantity with Owner) Hubbell Model CFB4G30CI with 24GCCVR Cover (Color Selected by Architect). Provide blank plates as required.
   3. FB03: (1) Duplex Receptacle and (1) Data Port (Coordinate Quantity with Owner) Hubbell Model CFB2G25R with CFBS1R6CVRALU round cover. Confirm requirements with RFID Gate Floor Box detail on construction documents.

PART 3 EXECUTION

3.01 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.

B. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of wiring devices provided under this section.

C. Install wiring devices in accordance with manufacturer's instructions.

D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.

E. Where required, connect wiring devices using pigtails not less than 6 inches (150 mm) long. Do not connect more than one conductor to wiring device terminals.

F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.

G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.

H. Install wiring devices plumb and level with mounting yoke held rigidly in place.

I. Install wall switches with OFF position down.

J. Install wall dimmers to achieve full rating specified and indicated after derating for ganging as instructed by manufacturer.

K. Do not share neutral conductor on branch circuits utilizing wall dimmers.

L. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.

M. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.

N. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.

3.02 ADJUSTING

A. Adjust devices and wall plates to be flush and level.

B. Adjust presets for wall dimmers according to manufacturer's instructions as directed by Architect.

END OF SECTION

SECTION 26 28 16.16
ENCLOSED SWITCHES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Enclosed safety switches.

1.02 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 05 29 - Hangers and Supports for Electrical Systems.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

D. Section 26 36 00 - Transfer Switches: Automatic and non-automatic switches listed for use as transfer switch equipment.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2018.

C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.

E. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.

F. UL 98 - Enclosed and Dead-Front Switches Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for enclosed switches and other installed components and accessories.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ABB/GE

B. Schneider Electric; Square D Products

C. Source Limitations: Furnish enclosed switches and associated components produced by the same manufacturer as the other electrical distribution equipment used for this project and obtained from a single supplier.

2.02 ENCLOSED SAFETY SWITCHES

A. Description: Quick-make, quick-break enclosed safety switches listed and labeled as complying with UL 98; general duty; ratings, configurations, and features as indicated on the drawings.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.

C. Unless otherwise indicated, provide products suitable for continuous operation under the following service conditions:

1. Altitude: Less than 6,600 feet (2,000 m).

2. Ambient Temperature: Between -22 degrees F (-30 degrees C) and 104 degrees F (40 degrees C).

D. Horsepower Rating: Suitable for connected load.

E. Voltage Rating: Suitable for circuit voltage.

F. Short Circuit Current Rating:

G. Provide with switch blade contact position that is visible when the cover is open.

H. Conductor Terminations: Suitable for use with the conductors to be installed.

I. Provide solidly bonded equipment ground bus in each enclosed safety switch, with a suitable lug for terminating each equipment grounding conductor.

J. Enclosures: Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E.

1. Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

K. Provide safety interlock to prevent opening the cover with the switch in the ON position with capability of overriding interlock for testing purposes.

L. General Duty Switches:

1. Conductor Terminations:

a. Provide mechanical lugs.

b. Lug Material: Aluminum, suitable for terminating aluminum or copper conductors.

2. Provide externally operable handle with means for locking in the OFF position, capable of accepting two padlocks.

M. Provide the following features and accessories where indicated or where required to complete installation:

1. Hubs: As required for environment type; sized to accept conduits to be installed.

PART 3 EXECUTION

3.01 **INSTALLATION**

A. Install products in accordance with manufacturer's instructions.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide required support and attachment in accordance with Section 26 05 29.

E. Install enclosed switches plumb.

F. Except where indicated to be mounted adjacent to the equipment they supply, mount enclosed switches such that the highest position of the operating handle does not exceed 79 inches (2000 mm) above the floor or working platform.

G. Provide grounding and bonding in accordance with Section 26 05 26.

3.02 **ADJUSTING**

A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

3.03 **CLEANING**

A. Clean dirt and debris from switch enclosures and components according to manufacturer's instructions.

B. Repair scratched or marred exterior surfaces to match original factory finish.

END OF SECTION

SECTION 26 43 00

SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Surge protective devices for service entrance locations.

1.02 RELATED REQUIREMENTS

A. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

B. Section 26 24 16 - Panelboards.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum); 2014.

C. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

D. UL 1449 - Standard for Surge Protective Devices; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Include detailed component information, voltage, surge current ratings, repetitive surge current capacity, voltage protection rating (VPR) for all protection modes, maximum continuous operating voltage (MCOV), nominal discharge current (I-n), short circuit current rating (SCCR), connection means including any required external overcurrent protection, enclosure ratings, outline and support point dimensions, weight, service condition requirements, and installed features.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Field-installed, Externally Mounted Surge Protective Devices:
   1. Current Technology; a brand of Thomas & Betts Power Solutions; www.tnbpowersolutions.com.
   2. Schneider Electric; Square D Brand Surgelogic Products; www.surgelogic.com.

B. Factory-installed, Internally Mounted Surge Protective Devices:
   1. Same as manufacturer of equipment containing surge protective device, to provide a complete listed assembly including SPD.

2.02 SURGE PROTECTIVE DEVICES - GENERAL REQUIREMENTS

A. Description: Factory-assembled surge protective devices (SPDs) for 60 Hz service; listed, classified, and labeled as suitable for the purpose intended; system voltage as indicated on the drawings.

B. Protected Modes:
   1. Wye Systems: L-N, L-G, N-G, L-L.

C. UL 1449 Voltage Protection Ratings (VPRs):
   1. 208Y/120V System Voltage: Not more than 1,000 V for L-N, L-G, and N-G modes and 1,200 V for L-L mode.

D. UL 1449 Maximum Continuous Operating Voltage (MCOV): Not less than 115% of nominal system voltage.

E. Enclosure Environment Type per NEMA 250: Unless otherwise indicated, as specified for the following installation locations:

F. Mounting for Field-installed, Externally Mounted SPDs: Unless otherwise indicated, as specified for the following locations:

G. Equipment Containing Factory-installed, Internally Mounted SPDs: Listed and labeled as a complete assembly including SPD.
   1. Panelboards: See Section 26 24 16.

2.03 SURGE PROTECTIVE DEVICES FOR SERVICE ENTRANCE LOCATIONS

A. Unless otherwise indicated, provide field-installed, externally mounted or factory-installed, internally mounted SPDs.

B. List and label as complying with UL 1449, Type 1 when connected on line side of service disconnect overcurrent device and Type 1 or 2 when connected on load side of service disconnect overcurrent device.

C. Provide SPDs utilizing field-replaceable modular or non-modular protection circuits.

D. Surge Current Rating: Not less than 120 kA per mode/240 kA per phase.

E. UL 1449 Nominal Discharge Current (I-n): 20 kA.

F. UL 1449 Short Circuit Current Rating (SCCR): Not less than the available fault current at the installed location as indicated on the drawings.

G. Diagnostics:
   1. Protection Status Monitoring: Provide indicator lights to report the protection for each phase.
   2. Alarm Notification: Provide indicator light and audible alarm to report alarm condition. Provide button to manually silence audible alarm.

H. Provide surge rated integral disconnect switch for SPDs not connected to a dedicated circuit breaker or fused switch or not direct bus connected.

PART 3 EXECUTION

3.01 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.

D. Provide conductors with minimum ampacity as indicated on the drawings, as required by NFPA 70, and not less than manufacturer's recommended minimum conductor size.

E. Install conductors between SPD and equipment terminations as short and straight as possible, not exceeding manufacturer's recommended maximum conductor length. Breaker locations may be reasonably rearranged in order to provide leads as short and straight as possible. Twist conductors together to reduce inductance.

F. Do not energize SPD until bonding of neutral and ground for service entrance and separately derived systems is complete in accordance with Section 26 05 26 where applicable. Replace SPDs damaged by improper or missing neutral-ground bond.

END OF SECTION

SECTION 26 51 00

INTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Interior luminaires.

B. Emergency lighting units.

C. Exit signs.

1.02 RELATED REQUIREMENTS

A. Section 26 05 33.16 - Boxes for Electrical Systems.

B. Section 26 09 23 - Lighting Control Devices: Automatic controls for lighting including occupancy sensors, outdoor motion sensors, time switches, outdoor photo controls, and daylighting controls.

C. Section 26 27 26 - Wiring Devices: Manual wall switches and wall dimmers.

1.03 REFERENCE STANDARDS

A. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.

B. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).

C. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

D. NECA/IESNA 500 - Standard for Installing Indoor Commercial Lighting Systems; 2006.

E. NECA/IESNA 502 - Standard for Installing Industrial Lighting Systems; 2006.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. NFPA 101 - Life Safety Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

H. UL 924 - Emergency Lighting and Power Equipment; Current Edition, Including All Revisions.

I. UL 1598 - Luminaires; Current Edition, Including All Revisions.

J. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, installed accessories, and ceiling compatibility; include model number nomenclature clearly marked with all proposed features.

1. LED Luminaires:

a. Include estimated useful life, calculated based on IES LM-80 test data.

1.05 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. LED Luminaires:
   1. Components: UL 8750 recognized or listed as applicable.
   2. Tested in accordance with IES LM-79 and IES LM-80.
   3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

H. LED Tape Lighting Systems: Provide all power supplies, drivers, cables, connectors, channels, covers, mounting accessories, and interfaces as necessary to complete installation.
   1. LED Tape - General Requirements:
      a. Listed.
      b. Designed for field cutting in accordance with listing.

2.03 EMERGENCY LIGHTING UNITS

A. Description: Emergency lighting units complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.

B. Operation: Upon interruption of normal power source or brownout condition exceeding 20 percent voltage drop from nominal, solid-state control automatically switches connected lamps to integral battery power for minimum of 90 minutes of rated emergency illumination, and automatically recharges battery upon restoration of normal power source.

C. Battery:
   1. Size battery to supply all connected lamps, including emergency remote heads where indicated.

D. Diagnostics: Provide power status indicator light and accessible integral test switch to manually activate emergency operation.

E. Provide low-voltage disconnect to prevent battery damage from deep discharge.

2.04 EXIT SIGNS

A. Description: Internally illuminated exit signs with LEDs unless otherwise indicated; complying with NFPA 101 and all applicable state and local codes, and listed and labeled as complying with UL 924.
   1. Number of Faces: Single or double as indicated or as required for the installed location.
   2. Directional Arrows: As indicated or as required for the installed location.

2.05 BALLASTS AND DRIVERS

A. Ballasts/Drivers - General Requirements:
   1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
   2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.

B. Dimmable LED Drivers:

1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
2. Control Compatibility: Fully compatible with the dimming controls to be installed.
   a. Wall Dimmers: See Section 26 27 26.

PART 3 EXECUTION

3.01 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install products in accordance with manufacturer's instructions.

D. Install luminaires securely, in a neat and workmanlike manner, as specified in NECA 500 (commercial lighting) and NECA 502 (industrial lighting).

E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

F. Suspended Ceiling Mounted Luminaires:
   1. Do not use ceiling tiles to bear weight of luminaires.
   2. Do not use ceiling support system to bear weight of luminaires unless ceiling support system is certified as suitable to do so.
   3. Secure lay-in luminaires to ceiling support channels using listed safety clips at four corners.
   4. See appropriate Division 9 section where suspended grid ceiling is specified for additional requirements.

G. Recessed Luminaires:
   1. Install trims tight to mounting surface with no visible light leakage.

H. Install accessories furnished with each luminaire.

I. Bond products and metal accessories to branch circuit equipment grounding conductor.

J. Emergency Lighting Units:

K. Exit Signs:
   1. Unless otherwise indicated, connect unit to unswitched power from same circuit feeding normal lighting in same room or area. Bypass local switches, contactors, or other lighting controls.

3.02 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Inspect each product for damage and defects.

C. Operate each luminaire after installation and connection to verify proper operation.

D. Test self-powered exit signs, emergency lighting units, and fluorescent emergency power supply units to verify proper operation upon loss of normal power supply.

E. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect.

3.03 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

B. Aim and position adjustable emergency lighting unit lamps to achieve optimum illumination of egress path as required or as directed by Architect or authority having jurisdiction.

C. Exit Signs with Field-Selectable Directional Arrows: Set as indicated or as required to properly designate egress path as directed by Architect or authority having jurisdiction.

3.04 CLEANING

A. Clean surfaces according to NECA 500 (commercial lighting), NECA 502 (industrial lighting), and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

END OF SECTION

SECTION 26 56 00

EXTERIOR LIGHTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Exterior luminaires.

B. Poles and accessories.

1.02 RELATED REQUIREMENTS

A. Section 26 05 33.16 - Boxes for Electrical Systems.

B. Section 26 27 26 - Wiring Devices: Receptacles for installation in poles.

C. Section 26 51 00 - Interior Lighting.

1.03 REFERENCE STANDARDS

A. AASHTO LTS - Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signal; 2013 (Revised 2015).

B. IES LM-79 - Approved Method: Electrical and Photometric Measurements of Solid-State Lighting Products; 2008.

C. IES LM-80 - Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules; 2015, with Errata (2017).

D. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

E. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems; 2006.

F. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

G. UL 1598 - Luminaires; Current Edition, Including All Revisions.

H. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.

1. LED Luminaires:
    a. Include estimated useful life, calculated based on IES LM-80 test data.

1.05 WARRANTY

A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.

B. Provide three year manufacturer warranty for all LED luminaires, including drivers.

PART 2 PRODUCTS

2.01 LUMINAIRE TYPES

A. Furnish products as indicated in luminaire schedule included on the drawings.

2.02 LUMINAIRES

A. Provide products that comply with requirements of NFPA 70.

B. Provide products that are listed and labeled as complying with UL 1598, where applicable.

C. Provide products listed, classified, and labeled as suitable for the purpose intended.

D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.

E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.

F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.

G. LED Luminaires:
   1. Components: UL 8750 recognized or listed as applicable.
   2. Tested in accordance with IES LM-79 and IES LM-80.
   3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

2.03 POLES

A. All Poles:
   1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
   2. Structural Design Criteria:
      a. Comply with AASHTO LTS.
      b. Wind Load: Include effective projected area (EPA) of luminaire(s) and associated supports and accessories to be installed.
   3. Material: Steel, unless otherwise indicated.
   4. Shape: Square straight, unless otherwise indicated.
   5. Finish: Match luminaire finish, unless otherwise indicated.

PART 3 EXECUTION

3.01 INSTALLATION

A. Coordinate locations of outlet boxes provided under Section 26 05 33.16 as required for installation of luminaires provided under this section.

B. Perform work in accordance with NECA 1 (general workmanship).

C. Install products in accordance with manufacturer's instructions.

D. Install luminaires in accordance with NECA/IESNA 501.

E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.

F. Wall-Mounted Luminaires: Unless otherwise indicated, specified mounting heights are to center of luminaire.

G. Install accessories furnished with each luminaire.

H. Bond products and metal accessories to branch circuit equipment grounding conductor.

I. Install lamps in each luminaire.

3.02 ADJUSTING

A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect. Secure locking fittings in place.

3.03 CLEANING

A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

END OF SECTION

SECTION 28 10 00

ACCESS CONTROL

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Access control point peripherals, including readers.

1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware: Electrically operated door hardware, for interface with access control system.

B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

C. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

D. Section 28 31 11 - Building Intrusion Detection: For interface with access control system.

E. Section 28 46 00 - Fire Detection and Alarm: For interface with access control system.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

C. UL 294 - Access Control System Units; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Include plan views indicating locations of system components and proposed size, type, and routing of conduits and/or cables. Include elevations and details of proposed equipment arrangements. Include system interconnection schematic diagrams. Include requirements for interface with other systems.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Provide Access control card equal to devices provided on WP04 and WP03. Submit request to JE Dunn and Engineer for specific model.

B. Products other than basis of design are subject to compliance with specified requirements and prior approval of Engineer. By using products other than basis of design, Contractor accepts responsibility for costs associated with any necessary modifications to related work, including any design fees.

2.02 ACCESS CONTROL SYSTEM REQUIREMENTS

A. Provide new access control system consisting of all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. Provide products listed, classified, and labeled as suitable for the purpose intended.
   1. Access Control Units and Readers: Listed and labeled as complying with UL 294.

2.03 ACCESS CONTROL UNITS AND SOFTWARE

A. Provide access control units and associated software compatible with readers to be connected.

2.04 ACCESS CONTROL POINT PERIPHERALS

A. Provide devices compatible with control units.

B. Provide devices suitable for operation under the service conditions at the installed location.

C. Provide readers compatible with credentials to be used.

D. Door Locking Devices (Electric Strikes and Magnetic Locks): Comply with Section 08 71 00.

2.05 ACCESSORIES

A. Provide components as indicated or as required for connection of access control system to devices and other systems indicated.

B. Unless otherwise indicated, credentials to be provided by Contractor.
   1. Provide credentials compatible with readers and control units/software to be used.

C. Provide cables as indicated or as required for connections between system components.

D. Provide accessory racks/cabinets as indicated or as required for equipment mounting.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install access control system in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Provide grounding and bonding in accordance with Section 26 05 26.

D. Identify system wiring and components in accordance with Section 26 05 53.

E. The access control to be provided by ACS. Contact Warren Toler at 913-284-2446.

3.02 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Prepare and start system in accordance with manufacturer's instructions.

C. Program system parameters according to requirements of Owner.

D. Test for proper interface with other systems.

E. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

END OF SECTION

SECTION 28 31 11

BUILDING INTRUSION DETECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Intrusion detection system requirements.

B. Alarm control unit.

C. Keypads.

D. Initiating devices.

E. Alarm notification appliances.

F. Accessories.

1.02 RELATED REQUIREMENTS

A. Section 08 71 00 - Door Hardware: Electrically operated locks and door holder devices to be monitored and controlled by intrusion detection system.

B. Section 26 05 26 - Grounding and Bonding for Electrical Systems.

C. Section 26 05 33.13 - Conduit for Electrical Systems.

D. Section 26 05 53 - Identification for Electrical Systems: Identification products and requirements.

E. Section 28 46 00 - Fire Detection and Alarm.

1.03 REFERENCE STANDARDS

A. NECA 1 - Standard for Good Workmanship in Electrical Construction; 2015.

B. UL 609 - Local Burglar Alarm Units and Systems; Current Edition, Including All Revisions.

C. UL 634 - Connectors and Switches for Use with Burglar-Alarm Systems; Current Edition, Including All Revisions.

D. UL 639 - Intrusion-Detection Units; Current Edition, Including All Revisions.

E. UL 864 - Control Units and Accessories for Fire Alarm Systems; Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each system component. Include ratings, configurations, standard wiring diagrams, dimensions, finishes, service condition requirements, and installed features.

PART 2 PRODUCTS

2.01 INTRUSION DETECTION SYSTEM REQUIREMENTS

A. Provide new intrusion detection system consisting of all required equipment, conduit, boxes, wiring, connectors, hardware, supports, accessories, software, system programming, etc. as necessary for a complete operating system that provides the functional intent indicated.

B. Alarm Control Unit: New addressable alarm control panel located as indicated.

C. Combination fire/intrusion systems are permitted only where ALL of the following conditions are met:
   1. Where combination fire/intrusion systems are specifically indicated or permitted in Section 28 46 00 or approved by Electrical Engineer.
   2. Where approved by authority having jurisdiction.
   3. Where alarm control units also comply with requirements of Section 28 46 00, including being listed and labeled as complying with UL 864.

D. Keypads: Located as indicated.

E. Initiating Device Requirements:
   1. Protected Premises: Entire building as indicated.
   2. Provide magnetic contacts to monitor opened/closed position for:
      a. All perimeter doors.
      b. All roof access doors and hatches.
   3. Provide motion detectors to detect intruder in designated areas.

F. Alarm Notification and Reporting Requirements:
   1. Activate alarm notification at alarm control unit and associated keypads/annunciators with appropriate zone information displayed.
   2. Activate local notification appliances.
      a. Interior: Provide siren located as indicated on drawings.

G. Interface with Other Systems:
   1. Provide products compatible with other systems requiring interface with intrusion detection system.
   2. Interface with electrically operated door hardware as specified in Section 08 71 00.
      a. Capable of locking/unlocking/releasing designated doors for selected intrusion detection system events.

H. Provide products listed, classified, and labeled as suitable for the purpose intended.
   1. Local Alarm Units and Systems: Listed and labeled as complying with UL 609.

I. Electromagnetic Interference/Radio Frequency Interference (EMI/RFI) Limits: Comply with FCC requirements of 47 CFR 15, for Class B, consumer application.

2.02 ALARM CONTROL UNIT

A. Manufacturers:
   1. Addressable Alarm Control Panel:
      a. DMP XR550 security panelboard.

B. Alarm Control Panel: Modular construction.
   1. Enclosure: Lockable; provide tamper protection.
   2. Power Supply:
      a. Primary Power: 120 VAC; provide suitable transformer/power supply; supervised for loss of AC power.
      b. Secondary Power: Standby battery; provide suitable capacity for minimum standby time required by listing requirements, applicable codes, and authority having jurisdiction, but not less than four hours; provide suitable battery charger; supervised for low battery condition; protected from accidental reversal of battery leads.

C. Alarm Initiating Circuits: Supervised.
   1. Hardwired Zones: Supports both normally closed and normally open conventional (non-addressable) initiating devices.
   2. Addressable Zones: Supports addressable initiating devices and modules using multiplexed polling loops.

D. Alarm Notification Circuits: Supervised.

E. Communications Interfaces: Supervised.
   1. Supports system reporting to central station receivers via integral interface or accessory interface modules using:
      a. Telephone lines.

F. Keypads: Supervised.

G. Peripheral Devices: Supervised; provide tamper protection.

H. Output Relays:
   1. Relay Modules: Form C relays (normally open and normally closed); provide tamper protection.
   2. Programmable to respond to system events, according to defined scheduling, or by manual activation from keypad.

I. User Codes:
   1. Each user code to be individually assignable to any defined authority level for configurable access to system features and functions.

J. Scheduling:
   1. Provide time/calendar-based scheduling capability for automated system control.
   2. Supports open/close schedules for control of arming/disarming and reporting.
   3. Supports timed events including, but not limited to:
      a. Point bypass/unbypass.
      b. Relay activate/deactivate.

K. Event Log:
   1. Stores system events including time, date, partition, zone, and user code where applicable.
   2. Supports viewing of event log on keypads.

2.03 KEYPADS

A. Manufacturer: Same as manufacturer of alarm control unit.

B. Provides interface to alarm control unit for system control and remote annunciation.

C. Provides visual notification of system status and zone information.

D. Provides audible notification to indicate system status, entry/exit delay, and alarm situations; provide separate distinguishable sounds for alarm and trouble conditions.

E. Keypad Type: Only LCD or graphic touch screen keypads are acceptable. Do not use LED keypads.

F. Graphic Touch Screen Keypads: Displays system status and zone information using plain English on graphic display; touch screen interface.

G. LCD Keypads: Displays system status and zone information using plain English on alphanumeric display; illuminated keys.

2.04 INITIATING DEVICES

A. Manufacturers:
   1. 360 degree motion detectors: Bosch DS939 with PIR technology only.
   2. Wall mount motion detectors: Bosch ISC-CDL1-W15G

B. General Requirements:
   1. Provide devices suitable for intended application and location to be installed.
   2. Outdoor Units: Weather resistant, suitable for outdoor use.
   3. Addressable Systems:
      a. Addressable Devices: Individually identifiable by control unit.
      b. Provide suitable addressable modules for connection to conventional (non-addressable) devices and other components that provide a dry closure output.

C. Contacts:
   1. Listed and labeled as complying with UL 634.
   2. Magnetic Contacts: Encapsulated reed switch(es) and separate magnet; designed to monitor opened/closed position of doors or windows.
      a. Use standard security contacts (not balanced magnetic type) unless otherwise indicated.

b. High Security Contacts: Balanced magnetic type; designed to activate upon attempts to defeat contact through external magnetic tampering.

3. Contact Color: To be selected by Architect from manufacturer's available standard colors.

D. Motion Detectors:

1. Listed and labeled as complying with UL 639.

2.05 ALARM NOTIFICATION APPLIANCES

A. Manufacturers: Same as manufacturer of alarm control units where possible.

B. Provide alarm notification appliances suitable for connection to control unit outputs.

C. Outdoor Units: Weather resistant, suitable for outdoor use.

D. Sirens: Speaker with self-contained siren driver.

1. Provide tamper switches for outdoor units.

2.06 ACCESSORIES

A. Provide components as indicated or as required for connection of alarm control unit to devices and other systems indicated.

B. Provide cables as indicated or as required for connections between system components.

C. Provide end-of-line resistors (EOLR) as required for supervision of hardwired zones.

PART 3 EXECUTION

3.01 INSTALLATION

A. Perform work in accordance with NECA 1 (general workmanship).

B. Install products in accordance with manufacturer's instructions.

C. Provide grounding and bonding in accordance with Section 26 05 26.

D. Identify system wiring and components in accordance with Section 26 05 53.

E. The security system shall be provided by ACS. Contact Warren Toler at 913-284-2446.

3.02 FIELD QUALITY CONTROL

A. See Section 01 40 00 - Quality Requirements, for additional requirements.

B. Prepare and start system in accordance with manufacturer's instructions.

C. Inspection and testing to include, at a minimum:

1. Test each initiating device for proper response by alarm control unit.
2. Test for proper operation of alarm notification appliances.
3. Test for proper operation of output relays.
4. Test for proper interface with other systems.

D. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

3.03 CLOSEOUT ACTIVITIES

A. Training: Train Owner's personnel on operation, adjustment, and maintenance of system.

1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
2. Provide minimum of four hours of training.
3. Instructor: Manufacturer's authorized representative.
4. Location: At project site.

END OF SECTION

SECTION 28 46 00

FIRE DETECTION AND ALARM

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fire alarm system design and installation, including all components, wiring, and conduit.

B. Replacement and removal of existing fire alarm system components, wiring, and conduit indicated.

1.02 RELATED REQUIREMENTS

A. Section 21 13 00 - Fire-Suppression Sprinkler Systems: Supervisory, alarm, and actuating devices installed in sprinkler system.

B. Section 23 33 00 - Air Duct Accessories: Smoke dampers monitored and controlled by fire alarm system.

1.03 REFERENCE STANDARDS

A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines; current edition.

B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.

C. IEEE C62.41.2 - IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits; 2002 (Corrigendum 2012).

D. NFPA 70 - National Electrical Code; Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

E. NFPA 72 - National Fire Alarm and Signaling Code; 2016.

1.04 SUBMITTALS

A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.

B. Proposal Documents: Submit the following with cost/time proposal:
   1. NFPA 72 "Record of Completion", filled out to the extent known at the time.
   2. Manufacturer's detailed data sheet for each control unit, initiating device, and notification appliance.
   3. Certification by Contractor that the system design will comply with the contract documents.
   4. Proposed maintenance contract.

C. Drawings must be prepared using AutoCAD.

D. Evidence of designer qualifications.

E. Design Documents: Submit all information required for plan review and permitting by authorities having jurisdiction, including but not limited to floor plans, riser diagrams, and description of operation:
   1. Copy (if any) of list of data required by authority having jurisdiction.
   2. NFPA 72 "Record of Completion", filled out to the extent known at the time.
   3. Clear and concise description of operation, with input/output matrix similar to that shown in NFPA 72 Appendix A-7-5-2.2(9), and complete listing of software required.
   4. System zone boundaries and interfaces to fire safety systems.
   5. Location of all components, circuits, and raceways; mark components with identifiers used in control unit programming.
   6. Circuit layouts; number, size, and type of raceways and conductors; conduit fill calculations; spare capacity calculations; notification appliance circuit voltage drop calculations.
   7. List of all devices on each signaling line circuit, with spare capacity indicated.
   8. Manufacturer's detailed data sheet for each component, including wiring diagrams, installation instructions, and circuit length limitations.

9. Description of power supplies; if secondary power is by battery include calculations demonstrating adequate battery power.
10. Certification by either the manufacturer of the control unit or by the manufacturer of each other component that the components are compatible with the control unit.
11. Certification by the manufacturer of the control unit that the system design complies with the contract documents.
12. Certification by Contractor that the system design complies with the contract documents.

F. Evidence of installer qualifications.

G. Inspection and Test Reports:
1. Submit inspection and test plan prior to closeout demonstration.
2. Submit documentation of satisfactory inspections and tests.
3. Submit NFPA 72 "Inspection and Test Form," filled out.

H. Operating and Maintenance Data: See Section 01 78 00 for additional requirements; revise and resubmit until acceptable; have one set available during closeout demonstration:
1. Complete set of specified design documents, as approved by authority having jurisdiction.
2. Additional printed set of project record documents and closeout documents, bound or filed in same manuals.
3. Contact information for firm that will be providing contract maintenance and trouble call-back service.
4. List of recommended spare parts, tools, and instruments for testing.
5. Replacement parts list with current prices, and source of supply.
6. Detailed troubleshooting guide and large scale input/output matrix.
7. Preventive maintenance, inspection, and testing schedule complying with NFPA 72; provide printed copy and computer format acceptable to Owner.
8. Detailed but easy to read explanation of procedures to be taken by non-technical administrative personnel in the event of system trouble, when routine testing is being conducted, for fire drills, and when entering into contracts for remodeling.

I. Project Record Documents: See Section 01 78 00 for additional requirements; have one set available during closeout demonstration:
1. Complete set of floor plans showing actual installed locations of components, conduit, and zones.
2. "As installed" wiring and schematic diagrams, with final terminal identifications.
3. "As programmed" operating sequences, including control events by device, updated input/output chart, and voice messages by event.

J. Closeout Documents:
1. Certification by manufacturer that the system has been installed in compliance with manufacturer's installation requirements, is complete, and is in satisfactory operating condition.
2. NFPA 72 "Record of Completion", filled out completely and signed by installer and authorized representative of authority having jurisdiction.

1.05 QUALITY ASSURANCE

A. Designer Qualifications: NICET Level III or IV (3 or 4) certified fire alarm technician or registered fire protection engineer, employed by fire alarm control panel manufacturer, Contractor, or installer, with experience designing fire alarm systems in the jurisdictional area of the authorities having jurisdiction.

B. Installer Qualifications: Firm with minimum 3 years documented experience installing fire alarm systems of the specified type and providing contract maintenance service as a regular part of their business.
1. Authorized representative of control unit manufacturer; submit manufacturer's certification that installer is authorized; include name and title of manufacturer's representative making certification.

2. Installer Personnel: At least 2 years of experience installing fire alarm systems.
3. Supervisor: NICET level III or IV (3 or 4) certified fire alarm technician; furnish name and address.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Fire Alarm Control Units and Accessories:
   1. Honeywell Security & Fire Solutions/Fire-Lite by ACS; www.firelite.com.
   2. Provide control units made by the same manufacturer.

B. Initiating Devices and Notification Appliances:
   1. Honeywell Security & Fire Solutions/Fire-Lite; www.firelite.com.

2.02 FIRE ALARM SYSTEM

A. Fire Alarm System: Provide a new automatic fire detection and alarm system:
   1. Provide all components necessary, regardless of whether shown in the contract documents or not.
   2. Protected Premises: Entire building shown on drawings.
   3. Comply with the following; where requirements conflict, order of precedence of requirements is as listed:
      a. ADA Standards.
      b. The requirements of the local authority having jurisdiction.
      c. Applicable local codes.
      d. The contract documents (drawings and specifications).
      e. NFPA 72; where the word "should" is used consider that provision mandatory; where conflicts between requirements require deviation from NFPA 72, identify deviations clearly on design documents.
   4. Evacuation Alarm: Multiple smoke zones; allow for evacuation notification of any individual zone or combination of zones, in addition to general evacuation of entire premises.
   5. General Evacuation Zones: Each smoke zone is considered a general evacuation zone unless otherwise indicated, with alarm notification in all zones on the same floor, on the floor above, and the floor below.
   6. Fire Command Center: Location indicated on drawings.
   7. Fire Alarm Control Unit: New, located at fire command center.

B. Supervising Stations and Fire Department Connections:
   1. Public Fire Department Notification: By on-premises supervising station.
   2. On-Premises Supervising Station: None.

C. Circuits:
   1. Initiating Device Circuits (IDC): Class B, Style A.
   2. Signaling Line Circuits (SLC) Within Single Building: Class B, Style 0.5.
   3. Notification Appliance Circuits (NAC): Class B, Style W.

D. Power Sources:
   1. Primary: Dedicated branch circuits of the facility power distribution system.
   2. Secondary: Storage batteries.
   3. Capacity: Sufficient to operate entire system for period specified by NFPA 72.
   4. Each Computer System: Provide uninterruptible power supply (UPS).

2.03 FIRE SAFETY SYSTEMS INTERFACES

A. Supervision: Provide supervisory signals in accordance with NFPA 72 for the following:
   1. Sprinkler water control valves.
   2. Tamper Switch (Coordinate with Fire Sprinkler Contractor)
   3. Flow Switch (Coordinate with Fire Sprinkler Contractor)

4. Pre Action release control panel.

B. Alarm: Provide alarm initiation in accordance with NFPA 72 for the following:
   1. Sprinkler water flow.
   2. Duct smoke detectors.

C. HVAC:
   1. Duct Smoke Detectors: Close dampers indicated; shut down air handlers indicated.

2.04 COMPONENTS

A. General:
   1. Provide flush mounted units where installed in finish areas; in unfinished areas, surface mounted unit are acceptable.
   2. Provide legible, permanent labels for each control device, using identification used in operation and maintenance data.

B. Fire Alarm Control Units: Analog, addressable type; listed, classified, and labeled as suitable for the purpose intended.

C. Master Control Unit: As specified for Basis of Design above, or equivalent.

D. Initiating Devices:
   1. Addressable Systems:
      a. Addressable Devices: Individually identifiable by addressable fire alarm control unit.
      b. Provide suitable addressable interface modules as indicated or as required for connection to conventional (non-addressable) devices and other components that provide a dry closure output.
   2. Manual Pull Stations:
   3. Smoke Detectors:
   4. Duct Smoke Detectors:

E. Notification Appliances:
   1. Bells:
   2. Strobes:

F. Circuit Conductors: Copper or optical fiber; provide 200 feet (60 m) extra; color code and label.

G. Surge Protection: In accordance with IEEE C62.41.2 category B combination waveform and NFPA 70; except for optical fiber conductors.

H. Locks and Keys: Deliver keys to Owner.

I. Instruction Charts: Printed instruction chart for operators, showing steps to be taken when a signal is received (normal, alarm, supervisory, and trouble); easily readable from normal operator's station.
   1. Frame: Stainless steel or aluminum with polycarbonate or glass cover.
   2. Provide one for each control unit where operations are to be performed.
   3. Obtain approval of Owner prior to mounting; mount in location acceptable to Owner.
   4. Provide extra copy with operation and maintenance data submittal.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with applicable codes, NFPA 72, NFPA 70, and the contract documents.

B. Conceal all wiring, conduit, boxes, and supports where installed in finished areas.

C. Obtain Owner's approval of locations of devices, before installation.

D. Install instruction cards and labels.

E. Provide fire alarm wiring in EMT conduit in all exposed ceiling area. Route to associated ceiling mounted notification and initiating devices and install in 4x4 electrical boxes. All conduit shall route back to concealed ceiling area.

F. All ceiling and wall mounted notification and initiating devices shall be white in color.

3.02 INSPECTION AND TESTING FOR COMPLETION

A. Notify Owner 7 days prior to beginning completion inspections and tests.

B. Notify authorities having jurisdiction and comply with their requirements for scheduling inspections and tests and for observation by their personnel.

C. Provide the services of the installer's supervisor or person with equivalent qualifications to supervise inspection and testing, correction, and adjustments.

D. Prepare for testing by ensuring that all work is complete and correct; perform preliminary tests as required.

E. Provide all tools, software, and supplies required to accomplish inspection and testing.

F. Perform inspection and testing in accordance with NFPA 72 and requirements of local authorities; document each inspection and test.

G. Correct defective work, adjust for proper operation, and retest until entire system complies with contract documents.

3.03 CLOSEOUT

A. Closeout Demonstration: Demonstrate proper operation of all functions to Owner.
   1. Be prepared to conduct any of the required tests.
   2. Have at least one copy of operation and maintenance data, preliminary copy of project record drawings, input/output matrix, and operator instruction chart(s) available during demonstration.
   3. Have authorized technical representative of control unit manufacturer present during demonstration.
   4. Demonstration may be combined with inspection and testing required by authority having jurisdiction; notify authority having jurisdiction in time to schedule demonstration.
   5. Repeat demonstration until successful.

END OF SECTION

PROJECT MANUAL

Including Bid Documents & Contract Documents for Construction of

MID-CONTINENT PUBLIC LIBRARY

WORK PACKAGE 10
COLBERN ROAD BRANCH

1000 NE Colbern Rd, Lee's Summit, MO 64806

PART C

Of Parts A, B, C

SITEWORK
& LANDSCAPING

JE DUNN CONSTRUCTION

SAPP DESIGN + helix. ARCHITECTS

OCHSNER HARE & HARE - OLSSON - TRUE ENGINEERING

December 23, 2019

SDA PROJECT NO. 17-0900

SET NO._____C

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SECTION 096400 – WOOD FLOORING
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DIVISION 10 - SPECIALTIES

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SECTION 102113.19 - PLASTIC TOILET COMPARTMENTS
SECTION 102239 – FOLDING PANEL PARTITIONS
SECTION 102700 – STANCHION EQUIPMENT
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SECTION 104413 - FIRE PROTECTION CABINETS
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DIVISION 22 – PLUMBING

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SECTION 220529 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT
SECTION 220553 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT
SECTION 220719 - PLUMBING PIPING INSULATION
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DIVISION 23 – HVAC

SECTION 230529 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT
SECTION 230553 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT
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SECTION 230713 - DUCT INSULATION
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DIVISION 26 – ELECTRICAL

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES
SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS
SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS
SECTION 260533.13 - CONDUIT FOR ELECTRICAL SYSTEMS
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SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS
SECTION 260919 - ENCLOSED CONTACTORS
SECTION 260923 - LIGHTING CONTROL DEVICES
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SECTION 262816.16 - ENCLOSED SWITCHES
SECTION 264300 - SURGE PROTECTIVE DEVICES
SECTION 265100 - INTERIOR LIGHTING
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DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

SECTION 281000 - ACCESS CONTROL
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PROJECT MANUAL PART C – SITE WORK AND LANDSCAPING

DIVISION 31 - EARTHWORK

SECTION 311000 – SITE CLEARING
SECTION 312000 – EARTH MOVING
SECTION 313116 – TERMITE CONTROL

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 328400-AUTOMATIC IRRIGATION SYSTEMS
SECTION 329200-TURF AND GRASSES
SECTION 329219-NATIVE GRASS AND WILDFLOWER SEEDING
SECTION 329300-PLANTS
SECTION 329301-INTERIOR PLANTS

DIVISION 33 - UTILITIES

SECTION 330500 – COMMON WORK RESULTS FOR UTILITIES

DIVISION - KC METRO CHAPTER AMERICAN PUBLIC WORKS ASSOCIATION (SECTIONS NOT ATTACHED)

SECTION APWA2150 – EROSION AND SEDIMENT CONTROL
SECTION APWA2200 – PAVING
SECTION APWA2300 – INCIDENTAL CONSTRUCTION
SECTION APWA2500 – SANITARY SEWERS
SECTION APWA2600 – STORM SEWERS

WORK PACKAGE 10
COLBERN ROAD BRANCH
MID CONTINENT PUBLIC LIBRARY

SECTION 311000 – SITE CLEARING

1 PART 1 GENERAL

1.1 DELIVERY, STORAGE, AND HANDLING

Deliver materials to store at the site, and handle in a manner which will maintain the materials in their original manufactured or fabricated condition until ready for use.

2 PART 2 PRODUCTS

Not Used

3 PART 3 EXECUTION

3.1 PROTECTION

3.1.1 Roads and Walks

Keep roads and walks free of dirt and debris at all times.

3.1.2 Trees, Shrubs, and Existing Facilities

Trees, shrubs, etc. in the area of work shall be removed and disposed of offsite.

3.1.3 Utility Lines

Protect existing utility lines. Notify the Contracting Officer immediately of damage to or an encounter with an unknown existing utility line. The Contractor is responsible for the repairs of damage to existing utility lines. When utility lines which are to be removed and/or relocated are encountered within the area of operations, notify the Contracting Officer in ample time to minimize interruption of the service. See Earthwork specification section and plans for further notes.

3.2 CLEARING

Clearing shall consist of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Clearing shall also include the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work. Trees, stumps, roots, brush, and other vegetation in areas to be cleared shall be cut off flush with or below the original ground surface, except such trees and vegetation as may be indicated or directed to be left standing.

3.3 TREE REMOVAL

Where indicated or directed, trees and stumps that are designated as trees shall be removed from areas outside those areas designated for clearing and grubbing. This work shall include the felling of such trees and the removal of their stumps and roots as specified in paragraph GRUBBING. Trees shall be disposed of as specified in paragraph DISPOSAL OF MATERIALS.

3.4 GRUBBING

Grubbing shall consist of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas. Material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, shall be removed to a depth of not less than 18 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this contract, such as areas for buildings, and areas to be paved. Depressions made by grubbing shall be filled with suitable material and compacted to make the surface conform with the original adjacent surface of the ground.

3.5 DISPOSAL OF MATERIALS

Disposal shall be by the contractor, offsite, unless otherwise coordinated with the contracting officer.

End of Section 311100

SECTION 312000 – EARTHMOVING

1 PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

To be supplied later.

2 PART 2 PRODUCTS

2.1 REQUIREMENTS FOR OFFSITE SOILS

LOCATION OF AND MATERIAL FROM OFFSITE SOURCES SHALL BE APPROVED BY THE OWNER'S REPRESENTIVE.

2.2 BURIED WARNING AND IDENTIFICATION TAPE

Provide [polyethylene plastic] [and] [metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic] warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inches minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Provide permanent color and printing, unaffected by moisture or soil.

Warning Tape Color Codes	
Red	Electric
Yellow	Gas, Oil; Dangerous Materials
Orange	Telephone and Other Communications
Blue	Water Systems
Green	Sewer Systems
White	Steam Systems
Gray	Compressed Air

2.2.1 Warning Tape for Metallic Piping

Provide acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.003 inch and a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.2.2 Detectable Warning Tape for Non-Metallic Piping

Provide polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.004 inch, and a minimum strength of 1500 psi lengthwise and 1250

psi crosswise. Manufacture tape with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3 feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.3 DETECTION WIRE FOR NON-METALLIC PIPING

Insulate a single strand, solid copper detection wire with a minimum of 12 AWG.

2.4 MATERIAL FOR RIP-RAP

Refer to plans.

2.4.1 Rock

Provide rock fragments sufficiently durable to ensure permanence in the structure and the environment in which it is to be used. Use rock fragments free from cracks, seams, and other defects that would increase the risk of deterioration from natural causes.

3 PART 3 EXECUTION

3.1 STRIPPING OF TOPSOIL

Where indicated or directed, strip topsoil to a depth of 4 inches. Spread topsoil on areas already graded and prepared for topsoil or transported and deposited in stockpiles convenient to areas that are to receive application of the topsoil later, or at locations indicated or specified. Keep topsoil separate from other excavated materials, brush, litter, objectionable weeds, roots, stones larger than 2 inches in diameter, and other materials that would interfere with planting and maintenance operations. Additional topsoil shall be imported provide 6 inches of topsoil on all disturbed areas following construction.

3.2 GENERAL EXCAVATION

Perform excavation of every type of material encountered within the limits of the project to the lines, grades, and elevations indicated and as specified. Perform the grading in accordance with the typical sections shown and the tolerances specified in paragraph FINISHING. Transport satisfactory excavated materials and place in fill or embankment within the limits of the work. Excavate unsatisfactory materials encountered within the limits of the work below grade and replace with satisfactory materials as directed. Include such excavated material and the satisfactory material ordered as replacement in excavation. Dispose surplus satisfactory excavated material not required for fill or

embankment in areas approved for surplus material storage or designated waste areas. Dispose unsatisfactory excavated material in designated waste or spoil areas. During construction, perform excavation and fill in a manner and sequence that will provide proper drainage at all times. Excavate material required for fill or embankment in excess of that produced by excavation within the grading limits from the borrow areas indicated or from other approved areas selected by the Contractor as specified.

3.2.1 Ditches, Gutters, and Channel Changes

Finish excavation of ditches, gutters, and channel changes by cutting accurately to the cross sections, grades, and elevations shown on the drawings. Do not excavate ditches and gutters below grades shown. Backfill the excessive open ditch or gutter excavation with satisfactory, thoroughly compacted, material or with suitable stone or cobble to grades shown. Dispose excavated material as shown or as directed, except in no case allow material to be deposited a maximum 4 feet from edge of a ditch. Maintain excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.2.2 Trench Excavation Requirements

Excavate the trench as recommended by the manufacturer of the pipe to be installed. Slope trench walls below the top of the pipe, or make vertical, and of such width as recommended in the manufacturer's printed installation manual. Shore trench walls more than 5 feet high, cut back to a stable slope, or provide with equivalent means of protection for employees who may be exposed to moving ground or cave in. Excavate trench walls which are cut back to at least the angle of repose of the soil. Give special attention to slopes which may be adversely affected by weather or moisture content. Do not exceed the trench width below the pipe top of 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter, and do not exceed 36 inches plus pipe outside diameter for sizes larger than 24 inches inside diameter. Where recommended trench widths are exceeded, provide redesign, stronger pipe, or special installation procedures by the Contractor. The Contractor is responsible for the safety of installation crews, cost of redesign, stronger pipe, or special installation procedures without any additional cost to the Government.

3.2.2.1 Bottom Preparation

Grade the bottoms of trenches accurately to provide uniform bearing and support for the bottom quadrant of each section of the pipe. Excavate bell holes to the necessary size at each joint or coupling to eliminate point bearing. Remove stones as recommended by the pipe manufacturer, whichever is smaller, to avoid point bearing.

3.2.2.2 Removal of Unstable Material

Where unstable material is encountered in the bottom of the trench, remove such material to the depth directed and replace it to the proper grade with select granular

material. When removal of unstable material is required due to the Contractor's fault or neglect in performing the work, the Contractor is responsible for excavating the resulting material and replacing it without additional cost to the Government.

3.2.2.3 Jacking, Boring, and Tunneling

Unless otherwise indicated, provide excavation by open cut except that sections of a trench may be jacked, bored, or tunneled if, in the opinion of the Contracting Officer, the pipe, cable, or duct can be safely and properly installed and backfill can be properly compacted in such sections in a cost-effective manner. No payment will be authorized for alternate methods of installation without written approval from the contracting officer.

3.2.3 Underground Utilities

The Contractor is responsible for movement of construction machinery and equipment over pipes and utilities during construction. Report damage to utility lines or subsurface construction immediately to the Contracting Officer. Coordinate location of existing utilities with the Government. Conflicts of any nature between the proposed work, including grading, and existing utilities shall be brought to the attention of the engineer prior to the placement of work that may require adjustment. If cables/equipment are damaged or required to be replaced/relocated, all copper lines shall remain in service to the maximum extent possible to minimize downtime. All fiber cables will be required to be tested after repairs/splicing. Cable relocations shall be placed on the same route as existing fiber and shall not be exposed during construction other than at tie in locations. Drawings of new cable routes will need to be provided electronically following construction. All fiber shall be tested prior to construction and there shall not be any loss of signal strength following construction. See plans for anticipated relocation extents. Verify final extents with base personnel.

3.3 SELECTION OF BORROW MATERIAL

Select borrow material to meet the requirements and conditions of the particular fill or embankment for which it is to be used. Obtain borrow material from the borrow areas as approved by the contracting officer.

3.4 GROUND SURFACE PREPARATION

3.4.1 General Requirements

Remove and replace unsatisfactory material with satisfactory materials, as directed by the Contracting Officer, in surfaces to receive fill or in excavated areas. Scarify the surface to a depth of 6 inches before the fill is started. Plow, step, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so that the fill material will bond with the existing material. When subgrades are less than the specified density, break up the ground surface to a minimum depth of 6 inches, pulverizing, and compacting to the specified density. When the subgrade is part fill and part excavation or natural ground,

scarify the excavated or natural ground portion to a depth of 12 inches and compact it as specified for the adjacent fill.

3.4.2 Frozen Material

Do not place material on surfaces that are muddy, frozen, or contain frost. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Moisten material as necessary to provide the moisture content that will readily facilitate obtaining the specified compaction with the equipment used.

3.5 BACKFILLING AND COMPACTION

Place backfill adjacent to any and all types of structures, and compact to at least 95 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials, to prevent wedging action or eccentric loading upon or against the structure. Prepare ground surface on which backfill is to be placed and provide compaction requirements for backfill materials in

conformance with the applicable portions of paragraphs GROUND SURFACE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.6 SPECIAL REQUIREMENTS

Special requirements for both excavation and backfill relating to the specific utilities are as follows:

3.6.1 Rip-Rap Construction

Construct rip-rap on filter fabric in the areas indicated. Trim and dress indicated areas to conform to cross sections, lines and grades shown within a tolerance of 0.1 foot.

3.6.1.1 Stone Placement

Place rock for rip-rap on prepared bedding material to produce a well graded mass with the minimum practicable percentage of voids in conformance with lines and grades indicated. Distribute larger rock fragments, with dimensions extending the full depth of the rip-rap throughout the entire mass and eliminate "pockets" of small rock fragments. Rearrange individual pieces by mechanical equipment or by hand as necessary to obtain the distribution of fragment sizes specified above.

3.7 EMBANKMENTS

3.7.1 Earth Embankments

Construct earth embankments from satisfactory materials free of organic or frozen material and rocks with any dimension greater than 3 inches. Place the material in successive horizontal layers of loose material not more than 12 inches in depth. Spread each layer uniformly on a soil surface that has been moistened or aerated as necessary and scarified or otherwise broken up so that the fill will bond with the surface on which it is placed. After spreading, plow, disk, or otherwise brake up each layer; moisten or aerate as necessary; thoroughly mix; and compact to at least 95 percent laboratory maximum density for cohesive materials or 95 percent laboratory maximum density for cohesionless materials or 65% relative density for cohesionless materials. Compaction requirements for the upper portion of earth embankments forming subgrade for pavements are identical with those requirements specified in paragraph SUBGRADE PREPARATION. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, vibratory compactors, or other approved equipment.

3.8 SUBGRADE PREPARATION

3.8.1 Proof Rolling

For areas of pavement replacement, finish proof rolling on an exposed subgrade free of surface water (wet conditions resulting from rainfall) which would promote degradation of an otherwise acceptable subgrade. After stripping, proof roll the existing subgrade with a dumptruck weighing at least 20 tons. Operate the truck in a systematic manner to ensure the number of passes over all areas, and at speeds between 2-1/2 to 3-1/2 mph. Notify the Contracting Officer a minimum of 3 days prior to proof rolling. Perform proof rolling in the presence of the Contracting Officer. Undercut rutting or pumping of material as directed by the Contracting Officer and replace with fill and backfill material.

3.9 FINISHING

Finish the surface of excavations, embankments, and subgrades to a smooth and compact surface in accordance with the lines, grades, and cross sections or elevations shown. Provide the degree of finish for graded areas within 0.1 foot of the grades and elevations indicated except that the degree of finish for subgrades specified in paragraph SUBGRADE PREPARATION. Finish gutters and ditches in a manner that will result in effective drainage. Finish the surface of areas to be turfed from settlement or washing to a smoothness suitable for the application of turfing materials. Repair graded, topsoiled, or backfilled areas prior to acceptance of the work, and re-established grades to the required elevations and slopes.

3.10 PLACING TOPSOIL

On areas to receive topsoil, prepare the compacted subgrade soil to a 2 inches depth for bonding of topsoil with subsoil. Spread topsoil evenly to a thickness of 4 inch and grade to the elevations and slopes shown. Do not spread topsoil when frozen or excessively

wet or dry. Obtain material required for topsoil in excess of that produced by excavation within the grading limits from offsite areas.

Material Type	Location of Material	Test Frequency
Undisturbed native soil	Structures	Two random tests in building footings and two tests on subgrade within building line
Fills and backfills	Structures (adjacent to)	One test per structure per 200 sq m 2000 sq ft taken 300 mm 1 foot below finished grade
Subgrades	Site (except airfields	One test per 250 sq m 2500 sq ft
Embankments or borrow	Any	One test per lift per 400 cubic m 500 cubic yds placed
Native soil subgrade other than structures and parking	Any	One test or one test per 900 sq m 10,000 sq ft whichever is greater
Borrow	Any	One test per lift per 400 cubic m 500 cubic yds placed

End of Section 312000

SECTION 330500 - COMMON WORK AND CITY REFERENCE SPECIFICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Construction and Materials Specifications for the Underground Utilities for this project will conform to the latest “Standards and Specifications for the City of Lee’s Summit, Missouri” and the “Standards and Specifications for Kansas City Metropolitan Chapter of the American Public Works Association”. The following sections have been included

1. LS Section 2100 - Grading and Site Preparation
2. LS Section 2150 - Erosion and Sediment Control
3. APWA Standard Drawings - Erosion and Sediment Control
4. LS Section 2200 – Paving
5. LS Section 2200 - Appendices A&B - Subgrade Stabilization
6. LS Section 2300 - Incidental Construction
7. LS Section 2400 - Seeding and Sodding
8. LS Section 2600 - Storm Sewers
9. LS Section 3000 - Traffic Control, Marking, Signing
10. LS Section 3500 - Sanitary Sewers
11. LS Section 3900 - Water Mains

1.2 MEASUREMENT AND PAYMENT

A. Measurement and payment shall match the referenced sections.

B. All costs for items of work, which are not specifically mentioned to be included in a particular lump sum or unit price payment item, shall be included in the listed lump sum item most closely associated with the work involved.

END OF SECTION 330500

SECTION 313116 - TERMITE CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Soil treatment with termiticide.

B. Related Sections:
   1. Division 06 Section "Rough Carpentry" for wood preservative treatment by pressure process.

1.3 SUBMITTALS

A. Product Data: For each type of termite control product.
   1. Include the EPA-Registered Label for termiticide products.

B. Product Certificates: For termite control products, from manufacturer.

C. Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's records and include the following:
   1. Date and time of application.
   2. Moisture content of soil before application.
   3. Termiticide brand name and manufacturer.
   4. Quantity of undiluted termiticide used.
   5. Dilutions, methods, volumes used, and rates of application.
   6. Areas of application.
   7. Water source for application.

D. Wood Treatment Application Report: After application of termiticide is completed, submit report for Owner's records and include the following:
   1. Date and time of application.
   2. Termiticide brand name and manufacturer.
   3. Quantity of undiluted termiticide used.
   4. Dilutions, methods, volumes used, and rates of application.
   5. Areas of application.

E. Warranties: Sample of special warranties.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A specialist who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment and products in jurisdiction where Project is located.

B. Regulatory Requirements: Formulate and apply termiticides and termiticide devices according to the EPA-Registered Label.

C. Source Limitations: Obtain termite control products from single source.

1.5 PROJECT CONDITIONS

A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated or frozen. Do not treat soil while precipitation is occurring. Comply with requirements of the EPA-Registered Label and requirements of authorities having jurisdiction.

B. Coordinate soil treatment application with excavating, filling, grading, and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs before construction.

C. Apply wood treatment after framing, sheathing, and exterior weather protection is completed but before electrical and mechanical systems are installed.

1.6 WARRANTY

A. Soil Treatment Special Warranty: Manufacturer's standard form, signed by Applicator and Contractor, certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.
   1. Warranty Period: Three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

A. Termiticide: Provide an EPA-Registered termiticide, complying with requirements of authorities having jurisdiction, in an aqueous solution formulated to prevent termite infestation. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to product's EPA-Registered Label.
   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
      a. BASF Corporation, Agricultural Products; Termidor.
      b. Bayer Environmental Science; Premise 75.
      c. FMC Corporation, Agricultural Products Group; Dragnet FT or Talstar or Prevail.
      d. Syngenta; Demon TC or Prelude or Probuild TC.
   2. Service Life of Treatment: Soil treatment termiticide that is effective for not less than five years against infestation of subterranean termites.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of soil per termiticide label requirements, interfaces with earthwork, slab and foundation work, landscaping, utility installation, and other conditions affecting performance of termite control.

B. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparation before beginning application of termite control

treatment. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil within and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated except previously compacted areas under slabs and footings. Termiticides may be applied before placing compacted fill under slabs if recommended in writing by termiticide manufacturer.
   1. Fit filling hose connected to water source at the site with a backflow preventer, complying with requirements of authorities having jurisdiction.

3.3 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute treatment evenly.
   1. Slabs-on-Grade: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
   2. Foundations: Adjacent soil, including soil along the entire inside perimeter of foundation walls; along both sides of interior partition walls; around plumbing pipes and electric conduit penetrating the slab; around interior column footers, piers, and chimney bases; and along the entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
   3. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

D. Post warning signs in areas of application.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 313116

SECTION 323119 – ORNAMENTAL FENCE

PART 1 – GENERAL

1.1 WORK INCLUDED

A. The contractor shall provide all labor, materials and appurtenances necessary for installation of the welded ornamental steel fence system in accordance with the accompanying Drawings and these Specifications

1.2 SUMMARY

A. Section Includes:

1. Ornamental Fencing. The contractor shall supply a total fence system of Montage Plus® (standard picket spacing) Majestic™ design or approved equal. The system shall include all components (i.e., panels, posts, gates and hardware) required.

1.3 RELATED SECTIONS

A. Section 329200 – Turf and Grasses
B. Section 329300 - Plants

1.4 QUALITY ASSURANCE

The contractor shall provide laborers and supervisors who are thoroughly familiar with the type of construction involved and materials and techniques specified.

1.5 REFERENCES

- ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process.
- ASTM B117 - Practice for Operating Salt-Spray (Fog) Apparatus.
- ASTM D523 - Test Method for Specular Gloss
- ASTM D714 - Test Method for Evaluating Degree of Blistering in Paint.
- ASTM D822 - Practice for Conducting Tests on Paint and Related Coatings and Materials using Filtered Open-Flame Carbon-Arc Light and Water Exposure Apparatus.
- ASTM D1654 - Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments.
- ASTM D2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.
- ASTM D2794 - Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
- ASTM D3359 - Test Method for Measuring Adhesion by Tape Test.
- ASTM F2408 – Ornamental Fences Employing Galvanized Steel Tubular Pickets.

1.6 ACTION SUBMITTALS

A. Prior to delivery to the job site, contractor shall submit to the Owner or Landscape Architect the manufacturer's literarture of all materials along with the type of equipment to be used on this project.

B. Product Data: For each type of product.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of during a calendar year.

1.8 QUALITY ASSURANCE

A. Regulatory Requirements

1. Comply with applicable requirements of Federal, State, and Local laws, regulations and codes having jurisdiction at the project site.

B. Substitutions

1. Substitutions will not be permitted unless authorized in writing by Owner or Landscape Architect. Substitutions shall be substantiated and submitted in writing to the Owner and Landscape Architect at least thirty (30) days prior to start of the work under this Section. These provisions shall not relieve the Contractor of the responsibility of obtaining specified materials in advance.

C. Coordination

1. Work in conjunction with other trades as directed, taking all reasonable precautions to avoid disturbance or interference with any other operation or installation on the site. Contractors shall be responsible for the cost of replacing any material damaged as a result of his/her negligence.

D. Installer's Field Supervision:

1. Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

1.9 DELIVERY, STORAGE, AND HANDLING

1. Upon receipt at the job site, all materials shall be checked to ensure that no damage occurred during shipping or handling. Materials shall be stored in such a manner to ensure proper ventilation and drainage, and to protect against damage, weather, vandalism and theft.
2. Deliver packaged materials in unopened containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

1.10 JOB CONDITIONS

A Examination of Site:
The bidder must acknowledge that he has examined the site, Drawings and Specifications and the submission of a quotation shall be considered evidence that examinations have been made.

B. Field Conditions: The Contractor shall verify drawing dimensions with actual field conditions and inspect related work and adjacent surfaces. The Contractor shall report to the Landscape Architect all conditions which prevent proper execution of this work.

C. The Contractor shall determine the exact location of all existing utilities, structures, and geogrid reinforcement before commencing work. The Contractor shall conduct his work so as to prevent interruption of service or damage to them. The Contractor agrees to be fully responsible for any and all damage which might be occasioned by the Contractor's failure to exactly locate and preserve any and all utilities, structures, and geogrid reinforcement.

1.11 MATERIALS CLEAN-UP

A. The Contractor shall keep the premises free from rubbish and all debris associated with their work at all times and all unused materials and debris shall be removed from the site.

1.12 WARRANTY

A. All structural fence components (i.e. rails, pickets, and posts) shall be warranted within specified limitations, by the manufacturer for a period of 20 years from date of original purchase. Warranty shall cover any defects in material finish, including cracking, peeling, chipping, blistering or corroding.

B. Reimbursement for labor necessary to restore or replace components that have been found to be defective under the terms of manufactures warranty shall be guaranteed for five (5) years from date of original purchase.

PART 2 – MATERIALS

2.1 MANUFACTURER

A. The fence system shall conform to Montage Plus (standard picket space) Majestic design, flush bottom rail treatment, 3-Rail style manufactured by Ameristar Fence Products, Inc., Tulsa, Oklahoma or approved equal.

2.2 MATERIAL

A. Steel material for fence panels and posts shall conform to the requirements of ASTM A653/A653M, with a minimum yield strength of 45,000 psi (310 MPa) and a minimum zinc (hot-dip galvanized) coating weight of 0.60 oz/ft^2 (184 g/m^2), Coating Designation G-60.

B. Material for pickets shall be 3/4" square x 18 Ga. tubing. The rails shall be steel channel, 1.5" x 1.4375" x 14 Ga. Picket holes in the rail shall be spaced (specify 4.675" o.c. for standard picket space or 3.500" o.c. for 3" air space). Fence posts and gate posts shall meet the minimum size requirements of Table 1.

2.3 FABRICATION

A. Pickets, rails and posts shall be pre-cut to specified lengths. Rails shall be pre-punched to accept pickets.

B. Pickets shall be inserted into the pre-punched holes in the rails and shall be aligned to standard spacing using a specially calibrated alignment fixture. The aligned pickets and rails shall be joined at each picket-to-rail intersection by Ameristar's proprietary fusion welding process, thus completing the rigid panel assembly (Note: The process produces a virtually seamless, spatter-free good-neighbor appearance, equally attractive from either side of the panel).

C. The manufactured panels and posts shall be subjected to an inline electrode position coating (E-Coat) process consisting of a multi-stage pretreatment/wash, followed by a duplex application of an epoxy

primer and an acrylic topcoat. The minimum cumulative coating thickness of epoxy and acrylic shall be 2 mils (0.058 mm). The color shall be Black.

D. The manufactured fence system shall be capable of meeting the vertical load, horizontal load, and infill performance requirements for Commercial weight fences under ASTM F2408.

E. Gates with an out to out leaf dimension less than and including 72 inches shall be fabricated using Montage Plus ornamental panel material and 1-3/4" sq. x 14ga. gate ends. . All rail and upright intersections shall be joined by welding. All picket and rail intersections shall also be joined by welding.

PART 3 - EXECUTION

3.1 PREPARATION

All new installation shall be laid out by the contractor in accordance with the construction plans.

3.2 INSTALLATION

Fence post shall be spaced according to Table 3, plus or minus ¼". For installations that must be raked to follow sloping grades, the post spacing dimension must be measured along the grade. Fence panels shall be attached to posts with brackets supplied by the manufacturer. Posts shall be set in concrete footers having a minimum depth of 36" The "Earthwork" and "Concrete" sections of this specification shall govern material requirements for the concrete footer. Posts setting by other methods such as plated posts or grouted core-drilled footers are permissible only if shown by engineering analysis to be sufficient in strength for the intended application.

3.3 FENCE INSTALLATION MAINTENANCE

When cutting/drilling rails or posts adhere to the following steps to seal the exposed steel surfaces; 1) Remove all metal shavings from cut area. 2) Apply zinc-rich primer to thoroughly cover cut edge and/or drilled hole; let dry. 3) Apply 2 coats of custom finish paint matching fence color. Failure to seal exposed surfaces per steps 1-3 above will negate warranty. Ameristar spray cans or paint pens shall be used to prime and finish exposed surfaces; it is recommended that paint pens be used to prevent overspray. Use of non-Ameristar parts or components will negate the manufactures' warranty.

3.4 GATE INSTALLATION

Gate posts shall be spaced according to the manufacturers' gate drawings, dependent on standard out-to-out gate leaf dimensions and gate hardware selected. Type and quantity of gate hinges shall be based on the application; weight, height, and number of gate cycles. The manufacturers' gate drawings shall identify the necessary gate hardware required for the application. Gate hardware shall be provided by the manufacture of the gate and shall be installed per manufacturer's recommendations.

3.5 CLEANING

The contractor shall clean the jobsite of excess materials; post-hole excavations shall be scattered uniformly away from posts.

SECTION 328400 - AUTOMATIC IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 WORK INCLUDED

A. The work required under this section includes furnishing all labor, materials, accessories and equipment, and performing all operations necessary for the complete installation of the landscape irrigation system, including permits.

Power shall be provided to the irrigation controller by the electrical contractor. Final connection by irrigation contractor.

1.2 SUMMARY

A. All bids should reflect a total “turn-key” installation for each site. This would include all equipment. Each bid shall include all equipment and labor necessary to provide a “turn-key” installation.

B. The contractor shall include a projected time frame for installing the system. It should reflect, in calendar days, the anticipated time required from the day of the award to completion of the system in a fully operational mode. This schedule should reflect anticipated time for ordering and receiving all components, starting and ending times for installation, starting and ending times for training, system start-up, etc.

1.3 PERFORMANCE REQUIREMENTS

A. Irrigation zone control shall be automatic operation with controller.

B. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.

C. Minimum Working Pressures: The following are minimum pressure requirements for piping, valves, and specialties unless otherwise indicated:

1. Irrigation Main Piping: 120 psi
2. Circuit Piping: 60psi

1.4 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Manufacturing Qualifications: Provide landscape irrigation system as a complete unit produced by acceptable manufacturers for all portions of work, including heads, valves, piping, controllers, and accessories.

C. Installer qualification: Contractor shall be a firm specializing in irrigation work with a minimum of 10 years' experience in work of this type.

D. Referenced Standards: American Society for Testing and Materials, Annual Book of ASTM Standards, latest edition.

E. Codes and Standards: Irrigation installation shall comply with all applicable federal, state and local governing agency requirements and to industry standards. Notify Landscape Architect immediately in writing of any discrepancies, inconsistencies, or contradictory requirements.

F. Workmanship: Install materials and equipment in a neat and professional manner following manufacturer's recommendations.

1.5 SEQUENCING/SCHEDULING

A. Obtain information pertaining to the location of all existing utility lines and equipment prior to irrigation installation.

B. Install sleeves for all mainline, laterals, and wire that cross roadways, drives, sidewalks, and all other paving surfaces prior to placement of paving. It is the responsibility of the Irrigation Contractor to coordinate timing of sleeve installation and construction procedure with Paving Contractor to ensure proper sequencing.

C. Give at least seven (7) days notice to the Landscape Architect or his representative prior to all required site visits as indicated herein.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories. Only materials and items of equipment so approved shall be used.

B. Wiring Diagrams: For power, signal, and control wiring.

1.7 INFORMATIONAL SUBMITTALS

A. Controller Timing Schedule: Indicate timing settings for each automatic controller zone.

B. Field quality-control reports.

1.8 CLOSEOUT SUBMITTALS

A. Materials List: List all materials by manufacturer's name and model number. Only materials and items of equipment so approved shall be used.

B. Approvals: Submit documentation of all approvals required by local, municipal, and state jurisdictions.

C. Operational and Maintenance Data: Submit manufacturer's data in a three ring binder, labeled and indexed.

D. Record Drawings: Irrigation Contractor shall record and submit an “As-Built Drawing” which records actual installed conditions. The As-Built Drawing shall be submitted in an electronic format. Irrigation Contractor shall submit the As-Built Drawing to the Landscape Architect before work under this contract will be considered for Acceptance.

1.9 FEES AND PERMITS

A. Work under this Section shall include all fees, permits, licenses, and required inspections by concerned governing agencies.

1.10 DELIVERY, STORAGE AND HANDLING

A. Deliver materials and equipment in such a manner as not to damage the parts or decrease the useful life of equipment.

B. Store materials away from detrimental elements. Coordinate with Owner’s Representative, General Contractor, or Landscape Contractor, as appropriate, to secure a safe staging area.

C. Handle, load, unload, stack, and transport materials carefully to avoid damage. Handle pipe in accordance with manufacturer's recommendations.

1.11 JOB CONDITIONS

A. Prior to commencing any work required under the Contract, the Contractor shall locate all utilities, subsurface drainage, and underground construction so that proper precautions may be taken not to disturb or damage any subsurface improvements. Damage to any of the above mentioned items or other shall be promptly repaired by the contractor at no additional cost to the owner.

B. Water service and electric service will be supplied by the General Contractor as indicated on the plans for the purpose of the automatic irrigation system.

C. Irrigation System is to operate under the water pressure and flow rates prevailing at the project site. Irrigation Contractor shall be responsible for determining these parameters, and shall design the irrigation system in accordance with the existing or anticipated conditions.

D. Insurance on irrigation materials or equipment stored or installed is the responsibility of the Irrigation Contractor. Such insurance shall cover fire, theft, and vandalism. Should the Irrigation Contractor elect not to provide such insurance the Owner shall in no way be responsible for any losses incurred by the aforementioned acts. The Irrigation Contractor is responsible for all costs incurred in replacing damaged or stolen materials or equipment prior to Substantial Completion of the Work.

E. Obtain all required permits and pay all required fees at no additional cost to the Owner. Any penalties imposed due to failure to obtain permits or pay fees are the responsibility of the Irrigation Contractor.

F. Provide and maintain all passageways, guard fences, warning lights, and other protection devices required by local authorities or others having jurisdiction.

G. Irrigation Contractor shall adequately protect adjacent property as provided by law and the Contract Documents.

H. Existing Site Improvements: Perform Work in a manner that avoids damage to existing site

improvements. The Irrigation Contractor is responsible for any damage of mechanical nature as well as damage resulting from leaks in the irrigation system whether due to negligence or otherwise.

I. Test water conditions: Irrigation System is to operate under the water pressure and flow indicated on the irrigation plan. It shall be the responsibility of the Irrigation Contractor to measure or analyze the existing or anticipated water supply at the tap. Notify the Landscape Architect if conditions vary from plans.

1.12 WARRANTY AND SUBSTANTIAL COMPLETION

A. Substantial Completion

1. At the completion of the installation of the irrigation system components, and at the direction of the Owner, the Landscape Architect shall observe the conditions of the project for the purpose of verifying compliance with plans, details and specifications. A written report will be provided to the Owner listing any deviations or omissions. These issues will be resolved and verified by the Landscape Architect prior to the issuance of a Letter of Substantial Completion.

2. Contractor shall provide Landscape Architect with written notification stating that all installation, testing and training has been completed and approved. Notification shall be received prior to substantial completion.

B. All irrigation equipment including controller(s), control valves, sprinklers, rotors, and accessories shall have a five (5) year manufacturer's warranty. All other irrigation equipment, workmanship, and, supplies shall be warranted for one (1) year from date of issuance of the letter of substantial completion. All warranties shall be turned over to the Owner.

1.13 TRAINING

A. A minimum of 1 hour of training, for up to two (2) users determined by Owner and Landscape Architect shall be conducted by the Contractor on site, with installed system, after completion of project. The contractor is to schedule, coordinate, and attend the training session. Training shall include an overview of system operations as well as detailed one-on-one training for selected individuals for controller operation.

B. The control system manufacturer is to provide toll-free phone-in support to the Owner at no cost for a period of one (1) year within the initial purchase price of the system.

PART 2 - PRODUCTS

2.1 GENERAL

A. Specific requirements concerning the various materials and the arrangements in which they are to be installed are outlined in this Specification.

B. Quality and Size

1. Material specified by name and / or model number in the Specifications, on the site, or detailed drawings are used for the purpose of identification of materials and to ensure specific use of that material in the construction of the system. No substitutions will be permitted without approval.

2. All materials used in the system must be new and without flaws or defects of any type and be the best quality available.

2.2 ACCEPTABLE MANUFACTURERS

A. Manufacturer: Contractor materials shall comply with all requirements and provide irrigation equipment products from only the following:

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products not listed within this section may be incorporated into the Work.

2. Irrigation equipment including spray heads, rotors, nozzles, control valves, quick couplers, master valves, irrigation controller, rain sensors, low volume irrigation equipment, drip tubing and drip fittings including pressure regulators, filters, air relief valves, pipe fittings including swing assemblies, swing joints, barbed fittings, swing pipe and compression fittings shall be manufactured by the Rain Bird Corporation.

3. Decoder based irrigation control system equipment including, field decoders, line surge protection devices, sensors decoder and field transmitters shall be manufactured by the Rain Bird Corporation.

4. Decoder control wire shall be manufactured by Rain Bird Corporation.

5. Wire connectors shall be manufactured by Rainbird Corporation.

2.3 DELIVERY, STORAGE AND HANDLING

A. Manufactured materials shall be delivered in original containers with brand and maker's names marked thereon. Materials in broken containers or showing evidence of damage will be rejected and must be immediately removed from the work.

B. Store plastic pipe on flat pallets and protect from sunlight.

2.4 PIPES, TUBES, AND FITTINGS

A. Main Irrigation supply line. PVC plastic pipe, ASTM D 2241 Class 200 SDR 21.

B. Circuit Pipe for potable water (downstream from circuit valves): PVC plastic pipe, ASTM D 2241, Class 200 SDR 21.

C. Seamless Copper Pipe: ASTM B88, Type M, drawn temper.

D. Sleeving Pipe for Irrigation Supply Line: Schedule 40. PVC plastic pipe, ASTM D 1785 and D 1784, PS 21-70.

E. Fittings:
1. For PVC plastic pipe, ASTM D 2466 socket fittings with ASTM A 2564 solvent cement.
2. Metallic: Cast bronze with standard iron pipe thread; 125 bl. class rating in conformance with ANSI B16.15.
3. Copper: ANSI B16.22 wrought copper or cast brass, recessed solder joint type fittings.

F. Nipples:
1. Metallic: Schedule 40 red brass (35% copper, 15% zinc) pipe: threaded both ends. Pipe shall be in accordance with ASTM B43.

2. Plastic: Factory-threaded Schedule 80, Type 1, Grade 1 polyvinyl chloride (PVC) pipe, threaded both ends. Pipe shall be in conformance with ASTM D1784 and D1785. Color: grey.

G. Pipe Connection Materials: Solvent, primer and lubricants as recommended by the manufacturer.
1. Joint compound for threaded connections is Teflon or approved equal tape; UL listed.
2. No thinning of solvent or primer is allowed in any manner whatsoever.

2.5 WATER METER

A. Water meters, meter pits shall be sized as needed, and shall be provided per City specifications. Water meter size and location shall be shown on the drawings.

2.6 BACKFLOW PREVENTER

A. The backflow preventer shall be of the type required by the local water supplier. Backflow preventer shall be sized to meet flow and pressure requirements of the plans.

2.7 VALVES

A. Manufacturer's Standard, of type and size required, and as follows:

B. Furnish valves with plastic bodies, glass filled nylon or red brass, unless otherwise indicated.

C. Pressure Reducing Valve: If required, a standard capacity water pressure reducing valve with integral strainer, Watts U5 series or equal.

D. Master Valve.
1. Globe valve shall be normally closed 24 VAC 50/60 cycle solenoid actuated with a pressure rating of not less than 200 psi.
2. The valve body and bonnet shall be constructed of heavy cast red brass; diaphragm shall be of nylon reinforced nitrile rubber. All other internal parts shall be made of bronze, brass and stainless steel.
3. The valve shall have both internal and external manual open/close control to manual open and close the valve without electrically energizing the solenoid. The valve shall house a fully-encapsulated one piece solenoid.
4. The valve shall have a stainless steel flow control stem and cross handle for regulating or shutting off flow of water. The valve must open or close in less than one minute at 200psi.
5. The valve shall be sized to meet flow requirements shown on plans.
    a. Potable irrigation system: Rain Bird EFB-CP Series valve.

E. Zone Control Valves for potable irrigation system.
1. Globe valve shall be normally closed 24 VAC 50/60 cycle solenoid actuated with a pressure rating of not less than 200 psi.
2. The valve body and bonnet shall be constructed of heavy duty glass filled UV-resistant nylon and have stainless steel studs and flange nuts with a nylon reinforced nitrile rubber diaphragm.
3. The valve shall have both internal and external manual open/close control to manual open and close the valve without electrically energizing the solenoid. The valve shall house a fully-encapsulated one piece solenoid.

4. The valve shall have a brass flow control stem for accurate manual regulation and/or shut off of outlet flow.
5. The valve shall be sized to meet flow requirements shown on plans.
   a. Potable irrigation system: Rain Bird PEB Series valve.

F. Drip Zone Control Valve.
1. Preassembled Zone Control Valve Assembly designed specifically for drip irrigation applications. The Zone Control Kit shall consist of a valve, ball valve, pressure regulator and 200 mesh filter.
2. Globe configuration valve shall be normally closed 24 VAC 50/60 cycle solenoid actuated with a pressure rating of not less than 150 psi.
3. The valve body and bonnet shall be constructed of high impact, weather resistant plastic, stainless steel and other chemical / UV resistant materials.
4. The valve shall have a one unit diaphragm constructed of durable Buna-N rubber material with a clog resistant metering orifice and a double knife seal. The valve shall have one 90 mesh pilot filter attached to the diaphragm.
5. The valve shall have one fully encapsulated solenoid with captured plunger. The valve shall have one 90-mesh filter attached to the solenoid base.
6. The valve shall be capable of on/off control by turning the solenoid ¼ turn. The valve shall provide a flush mode that is manually activated by ½ turn of the bleed screw where external port is permissible.
7. The pressure regulating filter body shall be constructed of heavy duty, glass filled, UV resistant plastic material with a pressure rating of not less than 150 psi. The filter element shall be constructed of a durable polyester fabric attached to a propylene frame and shall be serviceable for cleaning by unscrewing the cap from the body.
8. The pressure regulator shall have a preset outlet pressure of approximately 40 psi in the 1" size and will accommodate an inlet pressure of not less than 150psi.
9. The valves shall be sized to meet flow requirements shown on plans.
   a. Potable irrigation system: Rain Bird XCZ-100-PRB-COM series valves
   b. Potable irrigation system (low flow conditions): Rain Bird XCZLF-100-PRF

G. Pressure Regulating Module for regulating outlet pressure at control valve from 15 – 100 psi.
1. The pressure regulating module shall be a two piece device consisting of a glass filled UV resistant nylon housing and dial cartridge. The regulator shall have visible pressure indication scale ranging from 0-100psi and an adjustable knob to provide fine tune adjustments in 1/3 psi increments.
2. The regulator shall have a Schrader valve to accommodate a pressure hose gauge. The regulator shall be water proof and provide regulation if the valve is manually internal bled or electronically activated.
3. The Pressure Regulating Module shall be Rain Bird PRS-D.

H. Quick Coupling Valve: Brass, Single piece construction, one inch female iron pipe size connection; vinyl covered brass hinged locking cover. Installed using Rain Bird TSJ series swing joints
1. Potable irrigation system: Yellow cap Rain Bird 44RC

I. Manual Drain Valves: Non-rising stem, 125 lbs, brass body and parts with wedge disc filled for key operation, as supplied by Crane or equal.

J. Manual Gate Valves (Isolation Valves): Non-rising stem, 125 lbs. brass body and parts with wedge disc filled for key operation, as supplied by Crane or equal.

K. Valve Box Cover and Frame:
1. Manufactures:

a. Rain Bird VB Series, manufactured by Rain Bird Corporation
b. Ametek plastic valve boxes, manufactured by Plymouth Products
c. or equal.

2. Potable water irrigation system:
   a. Turf areas: Green Cover
   b. Landscape beds: Black Cover
3. Sizes:
   a. 12” Standard; Rain Bird VB-STD
   b. 10” Round; Rain Bird VB-10RND

L. Drainage Pit Backfill: Cleaned gravel or crushed stone, graded from 2" maximum to 3/4" minimum. AB3 or equivalent is not acceptable backfill material.

2.8 SPRINKLER HEADS

A. Manufacturer's standard unit designed to provide uniform coverage over entire area of spray shown on drawings at available water pressure.
   1. Pop-up spray heads, 6" for turf, 12" shrubbery, 12" for groundcover: Rain Bird 1800 Series with plastic body, co-molded wiper seal, precision controlled flush at pop-down, built-in pressure regulator (PRS) built in the stem to maintain constant outlet pressure of 30 psi, designed for use with Rain Bird matched precipitation rate (MPR) plastic nozzles and high efficiency variable arc nozzles (HEVAN) in odd angle locations, installed using Rain Bird SA series swing assemblies. All pop-up spray heads are to have the built-in Seal-A-Matic (SAM) check valve.

2.9 TURF ROTORS

A. Manufacturer’s standard unit to provide uniform coverage over entire area of spray shown on drawings at designated water pressure.
   1. 6” Pop-up gear driven turf rotor: Rain Bird 5000 plus series with flow shut off device, an integral pressure regulator to reduce operating pressure to 45PSI and top arc adjustment using flat bladed screwdriver of 40-360 degrees, pressure activated multi functional wiper seal, designed for use with the MPR nozzle set providing matched precipitation from 25’ to 35’ using Rain Curtain™ technology installed using Rain Bird TSJ series swing joints. Rotors located in low elevation areas and will be susceptible to lateral pipe drain down as designated by Landscape Architect are to have a spring loaded Seal-A-Matic (SAM) device in the base of the case.

2.10 LANDSCAPE DRIPLINE

A. Flexible In-Line Drip Tubing
   1. Polyethylene tubing with factory installed, pressure compensating emitters with a spacing and consistent flow as listed on the plans.
   2. Pressure compensation will be accomplished through effective lengthening of the emitter flow path resulting with superior clog resistance.
   3. In-line emitter drip line shall have dual outlet ports to ensure direct contact with the ground.
   4. All drip tube to be staked in place using 12 gauge galvanized steel staples at 24”-36” OC.
   5. Rain Bird Easy Fit Compression Fitting System shall be used to connecting all drip tubing.
   6. In-line drip tubing shall be Rain Bird Landscape Dripline.
      a. Potable water irrigation system – landscape beds: XFD-09-24

2.11 AUTOMATIC CONTROL SYSTEM

A. The irrigation controller shall be a Rain Bird ESP-LXD controller.

1. The controller shall be housed in a wall-mountable, plastic locking cabinet suitable for either indoor or outdoor installation. The controller shall be capable of supporting up to 50 stations and shall have a maximum capacity of up to 200 stations. The controller shall interface to decoders capable of controlling 1, 2, 4 or 6 valves per unit (FD101, 102, 104 and 106). Sensor decoder for flow sensing is SD210. Surge suppression and grounding should follow the manufacturer's recommendation. The controller shall have 4 independent programs with 8 start times each. The controller shall include 2-wire diagnostic tools for diagnosis of field wiring, 2-wire path and solenoid issues.
2. The controller shall support up to 5 independently managed flow sensors interfaced with sensor decoders. The controller shall support up to five flow zones.
3. The controller shall incorporate a FloManager feature that shall provide real-time flow, power, and station management. FloWatch shall compare the current real-time flow rate to the learned rates and take user defined actions if problem is detected. FloWatch shall automatically determine the location of the flow problem and isolate the problem by turning off the affected station or master valve.

B. Exterior Controller Enclosure: Manufacturer's wall mounted weatherproof locking cabinet, complying with NFPA 70.

C. Field Decoders shall be Rain Bird FD-101TURF, FD-102TURF, FD-202TURF, FD-401TURF and FD-601TURF

1. Capable of controlling one, two, four or six valves per unit. The decoders shall be sealed in such a manner that they are not susceptible to moisture or inclement weather and can be buried underground. Decoders shall be installed in valve boxes adjacent to valve.
2. Surge Protection: Rain Bird LSP-1 Line Surge Protector, FD401TURF (built in surge protection), and/or FD601TURF (built in surge protection) required every 500' along tow-wire path.
3. Output power: Adjustable from controller – Inrush and holding current valves adjustable at controller.
4. Encapsulation: Fully waterproof
   i) Address: Pre-coded from factory Electrical Input: Nominal voltage: 34Vpp (24V AC) from two-wire line. Minimum voltage: 21 Vpp (15V AC). Maximum Voltage: 36 Vpp (25V AC)
5. Standby Current: FD-101TURF, FD-102TURF: 0.5 mA; FD-202TURF, FD-401TURF & FD-601TURF: 1 mA
6. Input Fuse (FD-401TURF & FD-601TURF only): 300-500 mA, thermal
7. Electrical Output:
   a. Max. voltage: 36 Vpp
   b. Max. load:
      1) FD-101TURF: 1 Rain Bird solenoid (one per address)
      2) FD-102TURF: 2 Rain Bird solenoids (two per address)
      3) FD-202TURF: 4 Rain Bird Solenoids (two per address)
      4) FD-401TURF: 4 Rain Bird Solenoids (one per address)
      5) FD-601TURF: 6 Rain Bird solenoids (one per address)

8. Maximum Cable Runs: 14 gauge – Star Pattern: 2.4 miles; Loop Pattern: 9.6 miles

Maximum Critical Path Lengths for 2-Wire Paths					
Nominal Wire Size	Ohms per 1000' or Ohms per Km (per conductor) Miles	Max. Length For Critical Path			
		Star		Loop	
		Km	Miles	Km	Miles
2.5 mm2	7.5 0hms/Km	3.00	1.86	12.00	7.46
14 AWG	2.58 0hms/1000'	2.66	1.65	10.63	6.61
12 AWG	1.62 0hms/1000'	4.23	2.63	16.93	10.52

9. Decoder/Solenoid Wires - Electrical Resistance: Max. 3 ohms
10. Max. Distance Decoder/Solenoids: Cable length: 14 gauge: 456 feet
11. Wiring: Paige special direct burial irrigation control cable,
12. Environment: Working range: 32° to 122° F (0° to 50° C); storage range: -4° to 158° F (-20 to 70° C); Humidity: 100%
13. Surge Protection: 40 V, 1.5 kW transil

D. Electrical Power: Contractor shall connect to power stubout provide on-site.

2.12 ELECTRIC WIRING

A. 120 Volt AC Wiring: 120 volt service to controller shall consist of three wires: one black, one white, and one ground. Electrical service is to be provided by the General Contractor unless otherwise directed by Owner's Representative.

B. Provide junction box, flush-mounted and gasketed per code as required.

C. 2-Wire Control Wiring shall be dual core, tin-coated, double insulated special irrigation control wire. Minimum wire size shall be fourteen (14) gauge. Wire to be Maxi-cable as manufactured by Rain Bird® Corporation, Azusa, California or approved equal.

D. Splices in controller wiring shall be waterproof direct bury application. Use Rain Bird-DBY T or R wire connectors. 3M DBY/R-6 are equal. No substitutions will be allowed.

2.13 SURGE PROTECTION FOR THE TWO-WIRE PATH

A. An LSP-1 Surge Arrestor shall be installed on the 2-wire communication path at each ESP-LXD controller location.

1. The Rain Bird™ LSP1Turf Line Surge Protector decoder specifications include but are not limited to:
   a. The line surge protector decoder shall be grounded on a two-wire path every 500 feet (150 meters) or every 8 decoders, whichever is smaller.
   b. The LSP1Turf Line Surge Protector decoder shall be placed on a two wire path with FD101Turf field decoder interfacing signal line and valves, FD102Turf field decoder

interfacing signal line and valve or pair of valves, and FD202Turf field decoder interfacing signal line and 2 valves or 2 pair of valves.

c. The LSP1Turf Line Surge Protector decoder shall be used for surge protection only, and shall not have a decoder address.

d. The LSP1Turf Line Surge Protector decoder shall protect against 40V, 1.5kW trasil.

2.14 GROUNDING

A. Controller, decoders and ancillary products used on a two-wire path shall be connected to a grounding system with a ground resistance of ten (10) ohms or less.

2.15 FLOW SENSOR

A. The flow sensor shall be an in line type with a nonmagnetic, spinning impeller (paddle wheel) as the only moving part. The electronics housing shall have two, ethylenepropylene O-Rings and shall be easily removed from the meter body. The sensor electronics will be potted in an epoxy compound designed for prolonged immersion. Electrical connections shall be 2 single conductor 18 AWG leads 48 inches (1,2 meters) long. Insulation shall be direct burial “UF” type colored red for the positive lead and black for the negative lead. The sensor shall be capable of operating in line pressures up to 400 psi (27,5 bars) and liquid temperatures up to 220° F, and operating in flows of ½ foot per second to 15 feet per second with linearity of ±1% and repeatability of ±1%. The meter body shall be cast 85-5-5-5 bronze, in 1” and 1½”, female iron pipe thread sizes. This flow sensor shall be Rain Bird Model FS series (appropriately sized based on flow).

2.16 RAIN FREEZE SENSOR

A. Provide and install a Rain Bird wireless Rain and Freeze Sensor (WR2-RFC) capable of turning off the irrigation system if adequate rainfall is received or freezing temperatures exist.

B. Contractor shall provide pole and footing for sensor installed per Rain Bird’s recommendations and specifications. Location approved by Landscape Architect.

C. Rain or rain / freeze sensor shall employ an electro-mechanical actuating mechanism designed to cause a circuit interrupt if programmable low temperature or rainfall set points are satisfied.

D. The device shall be used with 24VAC controllers and shall be of sufficient capacity to be used with a maximum of six 24VAC 7VA solenoids plus an additional master valve or pump start that does not exceed 53VA.

E. The wireless rain sensor shall incorporate a provision that allows the installer to select from several rainfall or low temperature settings that can be programmed through the use of icons on a controller interface.

F. A sensor LED shall communicate signal strength during the installation process

2.17 MISCELLANEOUS TOOLS AND EQUIPMENT

A. The following list of items shall be submitted to the Landscape Architect prior to the final inspection of the irrigation system.

1. 2 quick coupler valve keys, Rain Bird 44-K
2. 2 hose swivel (1" x 3/4"), Rain Bird SH-2
3. 2 gate valve keys (48")

PART 3 - EXECUTION

3.1 GENERAL

A. The Contractor shall install all irrigation system components in accordance with the Irrigation and Landscape Plans, Details and these Specifications.

B. Schedule of Work: The Irrigation Contractor shall be responsible for the installation of the piping and equipment in a manner that will affect the earliest completion of the work in conformance with the construction progress schedules of other Contractors and Trades, and these Specifications.

C. Observations: In addition to normal progress inspection, the Contractor shall give at least 48 hours notice to the Landscape Architect for inspection as follows:
   1. Layout of the system.
   2. Pressure tests.
   3. Coverage adjustment; Automatic operation.
   4. Punch list inspection.

D. Quick Coupler Valves: Locate quick coupler valves on mainline runs only, near pavement surfaces, and adjacent to annual planting beds. Space quick coupler valves at maximum 100’ intervals near parking lots, islands, building entries, sidewalks, entry monuments, and annual planting beds. Space quick coupler valves at maximum 200’ interval for large turf areas.

3.2 PROTECTION

A. The Contractor shall be responsible for storage of materials and any damage to the work covered by these Specifications before the final acceptance of the work.

B. Protect work and materials from damage during construction. Storage of polyvinyl chloride (PVC) pipe and fittings shall be protected from direct sunlight. Beds on which materials are stored must be the full length of the pipe to avoid damage. Any pipe that has been damaged or dented shall not be used in the work.

C. Any existing structures, equipment, utilities, pavement, landscaping, etc., damaged by Irrigation Contractor during the course of the work, including any damage caused by leakage or settling of piping systems being or having been installed by them, shall be restored at Contractor's expense and to the Owner's satisfaction.

D. Securely cover openings into the system and cover apparatus, equipment, and appliances, both before and after being set in place, to prevent obstruction in the pipes and the breakage, misuse or disfigurement of the apparatus, equipment or appliances.

3.3 LAYOUT AND VERIFICATION

A. The Contractor shall stakeout the locations of all piping, quick coupling valves, and emitters in accordance with the irrigation design drawings. The Contractor shall check and verify dimensions of layout and report variations to the Landscape Architect before proceeding. Layout work as accurately as possible to the drawings.

B. Minor changes in locations to the above from locations shown shall be made as necessary to avoid existing or proposed planting, piping, utilities, structures, etc., at the Contractor's expense, or when directed by the Landscape Architect, providing such change is ordered before such items or work directly connected to same are installed, and providing no additional materials are required.

C. The Contractor will be held responsible for the relocating of any items without first obtaining the Landscape Architect's approval. The Contractor shall remove and relocate such items, at his expense; if so directed by the Landscape Architect.

D. Before starting work on irrigation system, carefully check all grades to determine that work may safely proceed, keeping within the specified material depths. The Contractor shall be aware of the fact that the drawings are horizontal dimensions. Actual measurements taken along the slope of a bank will differ from those shown on the drawings.

E. No fittings shall be installed on pipe underneath pavement or walls except where noted on the Irrigation drawings. If such a need should occur, the Contractor shall bring it to the attention of the Landscape Architect.

F. Exact sprinkler head placement is based on and shall be coordinated with actual planting layout and shall be verified by the Landscape Architect.

G. All changes shall be recorded daily on the Record Drawings.

3.4 TRENCHING AND BACKFILLING

A. Provide a minimum of 18" cover over top of PVC main line for potable irrigation systems, or per city code.

B. Provide a minimum of 12” cover over top of PVC lateral piping for potable irrigation systems, or per city code.

C. Backfill with clean material from excavation. Remove organic material as well as rock and debris larger than 1" diameter. Irrigation piping shall have no rock or debris touching at any point along its length. A minimum of 6” clearance is required around all piping from all immovable obstructions. Place acceptable backfill material in 6" lifts, compacting each lift. Reference project geotechnical report for required backfill materials.

D. Backfill trench to within 6" of finished grade. Continue fill with acceptable topsoil and compact to bring even with existing grade. Thorough compaction at each sprinkler head, valve, and piping will be required. Repair all settled areas.

E. Boring underneath existing pavement may be required. PVC sleeving for irrigation main line shall be installed underneath all pavements.

F. Unless otherwise indicated, comply with requirements of the Uniform Plumbing code, city specifications, and all state or local codes.

3.5 TAPPING AND SUPPLY

A. Verify irrigation sub-meter and backflow preventer has been installed from domestic water supply line on site.

B. Install irrigation mainline tap to existing water stubout. Coordinate with general contractor for location.

C. Make electrical connections to electrical stubout from building. Coordinate with building contractor for location.

3.6 SLEEVING AND BORING

A. Install sleeving at a depth which permits the encased wiring to remain at the specified depth.

B. Extend the sleeve ends 6” beyond the edge of the paved surface. Cover pipe ends and mark with stakes.

C. Install separate sleeve beneath paved areas to route each run of wiring. Any existing sleeving is not to be used without the consent of the Owner’s Representative.

D. Sleeving material beneath pedestrian pavements shall be PVC Class 200 pipe with solvent welded joints.

E. Sleeving beneath drives and streets shall be PVC Sch. 40 pipe with solvent welded joints.

F. Sleeving diameter shall be equal to twice the diameter of the wiring bundle.

3.7 CIRCUIT VALVES

A. All valves shall be connected to main irrigation line in a plumb position. Each valve shall be installed in a valve box so that all parts of valve can be serviced. Valve boxes shall be installed over 6" of drainage gravel and shall be set so that the cover is flush with finish grade. Thorough compaction at valve boxes is required to bring the top of valve box 1” for turf and 2” for shrubs above finished grade after compaction and settlement has occurred. All settled valve boxes shall be raised prior to establishment acceptance.

B. Adjust automatic control valves to provide flow rate of rated operating pressure required for each sprinkler circuit.

C. Provide pressure regulation modules on the control valves for all zones that exceed recommended operating pressure by 5 psi as indicated in the irrigation zone schedule.

3.8 PIPING

A. Lay pipe in properly excavated trenches.

B. For all mainline piping, slope to manual drain valve and drainage pit at least 1/2" in 10' of run.

C. Install PVC pipe in dry weather when temperature is above 40 F in strict accordance with manufacturer's instructions. Allow joints to cure at least 24 hours at temperatures above 40 F (4 C) before testing, unless otherwise recommended by manufacturer.

D. Manual Drain Valves: Install manual drain valves at all low points in main irrigation supply line. Record location on as-built drawings.

E. Manual Gate Valves: Install manual gate valves at location shown on plan in main irrigation supply line. Record location on as-built drawings.

F. Drainage Pits: 3 cu. ft. of clean gravel, minimum 18" deep, 1-1/12" - 2" size, shall be located at all manual and automatic drain valves. Cover drainage pit with a soil separator and backfill to finish grade with excavated soil material.

G. Sleeves: Install sleeves for all main line, laterals, and wire that cross roadways, drives, sidewalks, and all other paving surfaces. Sleeves shall be a minimum of 4" diameter, and shall be sized to accommodate all equipment necessary. Top of sleeves shall be a minimum of 18" below surface of paving. Sleeves shall extend a minimum of 6" behind back of curb. Permanently mark location of each end of sleeve on back of curb.

3.9 SPRINKLER AND ROTOR HEADS

A. Flush circuit lines with full head of water and install heads after hydrostatic test is completed.

B. All sprinkler heads shall be set plumb at the elevation to be flush with finish grade.

C. Contractor shall adjust, if necessary, the elevation of the sprinkler heads after finish grade and landscape plantings are complete.

D. Install all sprinkler heads with pre-assembled swing-joints or swing-assemblies. Funny pipe will not be accepted for installation of any kind.

3.10 LANDSCAPE DRIPLINE

A. Final installation of drip irrigation to occur after the trees, shrubs and other plant material has been installed.

B. Flexible inline tubing or point source emitter tubing shall be used.

C. Layout drip and distribution tubing as detailed on the plans to place drip tubing near root zone of the plantings. Install drip tubing at or near the surface of planting soil.

D. Stake all drip tubing with steel stakes so that no movement of the pipe exists.

E. Pressurize, flush and cap drip tubing.

F. Cover drip tubing with specified depth of mulch.

3.11 CONTROLLER

A. Automatic controllers shall be wall mounted in locking cabinets at the locations approved by the Landscape Architect on drawings.

B. Contractor shall insure that controllers are properly programmed for this particular job prior to substantial completion of this project.

C. Control wire of system shall be 2 x 14 gauge, specifically designed for direct burial use. A minimum of 3'-0" of extra wire shall be spooled at each decoder location, at each splice, at each change in direction and at every 500 feet of straight run. At each termination of the mainline, an additional 6'-0" of wire shall be coiled and located within a valve box.

D. Control wire shall be installed in multiple wire paths as shown on the plans.

E. Wire shall be placed consistently along one side of the pipe in the trench. Splices and connections shall be watertight and leak proof, use Pin-Tight connections. Multiple wires in the trenches shall be banded together at 20-foot intervals for protection. Wire not along mainline pipe shall be placed within an electrical conduit.

F. Install monitoring equipment including Flow Meter, and Soil Moisture Sensor. Electrical connections between controller and monitoring equipment shall be installed by contractor per manufacturer's recommendations. Irrigation contractor is responsible for all electrical power connections from power supply point adjacent to weather station.

G. Install all surge protection as per manufacturer's latest instructions.

H. Install electrical connections between controller manufacturer's recommendations.

I. Install all surge protection as per manufacturer's latest instructions.

J. Lightning protection: Drive three 8' copper-clad grounds into the soil. If soil conditions prevent proper penetration of the ground rods into the soil, contact the Landscape Architect. Connect controller to grounding rod with AWG No. 10 Solid conductor copper wire. Secure wire to grounding rod with brass or bronze clamp.

3.1 INSTALLATION OF CONTROL SYSTEM COMPONENTS

A. Irrigation Control Units
1. The locations of the control units depicted on the drawings are approximate; the Owner's Representative, with assistance from the manufacturer's representative and the Landscape Architect, will determine the exact site locations at the system layout review.
2. General Contractor will provide all communication drop location as designated on the plans. The irrigation contractor is responsible for all connections from stubout locations. Coordinate with General Contractor.
3. General Contractor to provide all 120VAC power for control units. Coordinate location of power with Landscape Architect.
4. Install electrical connections between central control unit components and satellite control units per manufacturer's recommendations.
5. Connect control wire to corresponding control unit terminal. Connect wires to the satellite controller in the same order they are connected to the existing controller.
6. Connection to controller per manufacture recommendation.

3.2 MASTER VLAVE AND FLOW SENSOR

A. Install master valve, flow sensor and pulse transmitter as per manufacturer's directions.

B. Master valve and flow meter shall be installed in locking valve box per specification on detail sheets.

3.3 HYDROSTATIC TESTING

A. Contact the Landscape Architect, while the necessary piping system components are exposed. All mainline piping is to be subjected to a hydrostatic test. Subcontractor is to supply all testing equipment including all caps and gauges as required.

B. Pressure gauges shall be read in PSI. Calibration shall be such that accurate determination of potential pressure loss can be ascertained. Test supply line at a pressure of 120 PSI for minimum of one hour with an allowable loss of 5 PSI.

C. Re-test as required until the system meets the requirements. During the tests, regardless of the amount of leakage, all detectable leaks are to be stopped and all defects corrected.

3.4 ADJUSTING THE SYSTEM

A. Adjust alignment and coverage of all sprinklers and rotors if it is determined that adjustments in the irrigation equipment will provide proper and more adequate coverage. Make all necessary changes or make arrangements as directed by Landscape Architect. These changes or adjustments shall be made without additional cost.

3.5 RECORD DRAWINGS

A. Indicate actual location of all valves and controls including piping. Show dimensions from easily identifiable existing features such as walls, curbs, fences, buildings, or walks. Submit diagram to the Landscape Architect for approval.

B. Maintain progress drawings on the construction site at all times during installation of the irrigation system. Make a daily record of all work installed each day until completion of the work.

C. Submit to Owner ½ size reduction of the irrigation record drawing, laminated both sides, for inclusion into the inside of the controller door.

D. Submit to Owner (2) full size plan sets of the irrigation record drawings.

3.6 ACCEPTANCE

A. The Irrigation Contractor shall instruct the owner's designated personnel in the operation of the system pursuant to the training section already outlined in the specifications.

B. The Irrigation Contractor shall confirm that the system is installed and grounded per the manufacture's recommendations. The Contractor shall address any system deficiencies found by prior to substantial completion.

3.7 GUARANTEE AND MAINTENANCE INSTRUCTIONS

A. The Contractor shall fill and repair all depressions and replace all necessary lawn and planting due to the settlement of irrigation trenches for one year following the completing and acceptance of the job.

B. The Contractor shall also guarantee all materials, equipment and workmanship furnished by him to be free of all defects of workmanship and materials, and shall agree to replace at his expense, at any time within one year after installation is accepted, any and all defective parts that may be found. Contractor shall transfer all manufacturer material warrantees to the Owner. All manufacturer warrantees shall be in effect for the period outlined in the manufacturer literature from the date of installation. Contractor shall detail these warrantees and provide all necessary information regarding them to the Owner in the record drawing submittals.

C. The Contractor shall drain the irrigation system in the fall of the first year, and provide start up in the following spring.

D. After the system is installed and approved, instruct the Owner or Owner's representative as to the complete operation and maintenance.

END OF SECTION 328400

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 WORK INCLUDED

A. The Contractor shall furnish all labor, materials, tools, equipment, supervision, and services necessary to install sod, seed, preparation of soil, fine grading, watering, proper disposal of any excess earth or debris, all in accordance with the accompanying Drawings and these Specifications.

1.2 SUMMARY

A. Section Includes:

1. Seeding.
2. Sodding.

1.3 RELATED SECTIONS

A. Section 328400 – Automatic Irrigation System, Section 329219 – Native Grass and Wildflower Seeding, Section 329300 – Plants

1.4 DEFINITIONS

A. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

1.5 INFORMATIONAL SUBMITTALS

A. Prior to delivery to the job site, contractor shall submit to the Owner or Landscape Architect the source and supplier of all grass sod, seed, fertilizer and other materials along with the type of equipment to be used on this project.

B. Certification of grass seed.

C. Certification of each seed mixture for turfgrass sod.

D. Product certificates.

1.6 QUALITY ASSURANCE

A. Regulatory Requirements

1. Comply with applicable requirements of Federal, State, and Local laws, regulations and codes having jurisdiction at the project site.
2. Contractor shall be responsible for certificates of inspection of plant material that may be required by Federal and Local authorities to accompany shipments of plants.

B. Reference Standards
1. "Standardized Plant Names" by the American Joint Committee of Horticultural Nomenclature.
2. American National Standards Institute (ANSI); Publication Z60.1.

C. Coordination
1. Work in conjunction with other trades as directed, taking all reasonable precautions to avoid disturbance or interference with any other operation or installation on the site. Contractors shall be responsible for the cost of replacing any material damaged as a result of his/her negligence.

D. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
2. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

a. Landscape Industry Certified Technician - Exterior.
b. Landscape Industry Certified Lawncare Manager.
c. Landscape Industry Certified Lawncare Technician.

3. Pesticide Applicator: State licensed, commercial.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Storage of Materials
1. All materials delivered to the job shall be stored so as to keep them in new condition and free from deterioration. Peat moss, fertilizer, etc., shall be stored in temporary sheds off-site at Contractor’s expense.

B. Packaged Materials
1. Deliver packaged materials in unopened containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

C. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

D. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

1.8 JOB CONDITIONS

A. Examination of Site:
1. The bidder must acknowledge that he has examined the site, Drawings and Specifications and the submission of a quotation shall be considered evidence that examinations have been made.

B. Field Conditions: The Contractor shall verify drawing dimensions with actual field conditions and inspect related work and adjacent surfaces. The Contractor shall report to the Landscape Architect all conditions which prevent proper execution of this work.

C. The Contractor shall determine the exact location of all existing utilities, structures, and geogrid reinforcement before commencing work. The Contractor shall conduct his work so as to prevent

interruption of service or damage to them. The Contractor agrees to be fully responsible for any and all damage which might be occasioned by the Contractor's failure to exactly locate and preserve any and all utilities, structures, and geogrid reinforcement.

1.9 SEQUENCING AND SCHEDULING

A. Planting Time: Proceed with and complete planting as rapidly as portions of the site become available, working within seasonal limitations for each kind of landscape work required.

B. Planting Dates:
   1. Recommended dates for seeding and sodding shall be April 1 - June 15 for spring planting and September 1 - December 15 for fall planting.

1.10 MATERIALS CLEAN-UP

A. The Contractor shall keep the premises free from rubbish and all debris associated with their work at all times and all unused materials and debris shall be removed from the site.

1.11 WARRANTY

A. All plant material (lawns) shall be warranted for a period of not less than one (1) year from the date of issuance of the letter of Substantial Completion.

B. All replacement stock shall be subject to the same warranty requirements as the original stock. Any damage due to replacement operations shall be repaired by the Contractor. At the end of the warranty period, inspections shall be made jointly by the Owner, Landscape Architect, and Contractor. All lawn areas not in a healthy growing condition shall be removed and replaced with grasses of a like kind and size before the close of the next planting season and before issuance of the letter of Final Completion.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Rules for Testing Seeds" for purity and germination tolerances.

B. Grass seed shall be a blend of turf type fescues as detailed below. Provide fresh, clean, new-crop seed complying with established tolerances for germination and purity in accordance with the U.S. Department of Agriculture Rules and Regulations under the latest edition of the Federal Seed Act All seed shall be maxed by the Dealer and shall be delivered to the site in sealed containers which shall bear the Dealer's guaranteed analysis. Seed which has become wet, moldy, or otherwise damaged in transit or storage will not be acceptable

C. The seed mixture and seeding rate shall be as follows, or approved equivalent. Submit all seed certificates to the owner.

Seed type:	Pure Live Seed	Minimum % Germination	Application Rate Rate/1000sf
"1/3 Duster, 1/3 Plantation 1/3 Rebel II" Turf-Type Fescue	95%	90%	8 lbs.
Perennial Rye Grass	90%	90%	2 lbs.

Kentucky Bluegrass	90%	90%	2 lbs

2.2 TURFGRASS SOD

A. Turfgrass Sod: **Certified,** complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.

B. Turf Type Fescue Sod - Sod shall be a blend of not less than 3 improved Kentucky Bluegrass (Poa pratensis) varieties, a native mixture of Houndog, Rebel, or Falcon Finebladed Turf Type Tall Fescue (Festuca arundinacea), and Rye (Lolium jultiflorum and Perene domestic). It shall be a mix of 20% Kentucky Bluegrass, 70% Finebladed Turf Type Tall Fescue, and 10% Rye. Sod shall be well rooted, 2 year old stock, 3/4" thick, harvested in rolls, and fertilized 2-3 weeks prior to cutting. The sod shall be top quality certified sod, free of weeds, undesirable native grasses, insects and diseases. All sod shall be machine cut and vigorously growing (not dormant). Maximum time from stripping to planting shall be 24 hours.

C. Provide sod of uniform pad sizes with maximum 5 percent deviation in either length or width. Broken pads or pads with uneven ends will not be acceptable. Sod pads incapable of supporting their own weight when suspended vertically with a firm grasp on upper 10 percent of pad will be rejected.

2.3 FERTILIZERS

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, conforming to the applicable State Fertilizer Laws, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:
   1. Composition: Not less than 13% phosphoric acid and not less than 13% potassium, and percentage of nitrogen required to provide not less than 1 lb. of actual nitrogen per 1,000 sq. ft. of lawn area or as recommended by the County Extension Agent based on soil test results. Provide nitrogen in a form that will be available to lawn during period of growth.

2.4 PESTICIDES

A. General: Pesticide, registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

2.5 HYDROMULCH

A. Commercial Hydromulch: Commercial-grade hydromulch including specified seed, commercial starter fertilizer, fiber mulch and tackifier. Installed per manufacturer recommendations.
   1. ProMatrix Fiber Mulch as supplied by Profile: Buffalo Grove, IL
   2. Ranier Fiber Bonded Fiber Matrix as supplied by Rainier Veneer Inc.: Graham, WA
   3. Or Approved Equal

EXECUTION

2.6 TURF AREA PREPARATION

A. General:
   1. Clearing
      a. All areas of turf establishment are to be cleared by the Contractor.
      b. Clearing shall consist of the satisfactory removal and disposal of brush, rubbish, and other vegetative growth occurring within all proposed turf areas unless turf is being overseeded. All debris associated with this work shall be gathered and removed from the project by the Contractor.
   2. Preparation of Planting Mixture
      a. Mix recommended soil amendments and fertilizers with topsoil at rates recommended by the soil test results. Delay addition of fertilizer if planting mixture will not be used within two (2) days.
   3. Protection of Existing Vegetation
      a. All areas under drip lines of existing trees shall be kept free of construction equipment, trailers, material storage, and vehicles.
      b. Exercise extreme care when working around existing trees to remain. No soil scarification or compaction from construction vehicles shall occur under any existing tree dripline.
      c. In areas of established turf, the surrounding turf area shall be covered in a manner that will provide protection before excavations begin for sodded turf.

B. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

D. Before planting, obtain Landscape Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

2.7 SEEDING
   1. All established turf areas damaged during landscape installation and areas to be seeded as indicated on the plan shall be have temporary cover removed, fine graded and seeded as specified herein and in strict accordance with standard horticultural practices
   2. Seed shall be applied by hydroseeding as specified below.
      a. Hydroseeding: The application of grass seed and a wood fiber mulch tinted green (as specified) shall be accomplished in one operation by use of an approved spraying machine. Hydroseeding materials shall be applied per manufacturer’s directions.
      b. The operation of the hydroseeding equipment shall be by equipment manual. The spraying equipment shall be so design that when the solution is sprayed over an area, the resulting deposits of grass seed shall be equal in quantity to the required rates.
      c. Where newly seeded areas are subject to damage by erosion, washout, wind, etc., additional erosion control products will be required by the Landscape Architect. The areas which will require additional erosion control products will be identified in the field by the Landscape Architect.
      d. All areas which do not show a satisfactory catch of grass shall be reseeded at intervals of 21 days until a dense lawn of permanent grasses, free from any bare spots, areas of washout or erosion damage has been established.

e. Watering: Seeded areas shall be watered daily to insure good germination. Once seeds have germinated, watering may be decreased but the seedlings must never be allowed to dry out completely. Frequent watering should be continued for approximately three (3) weeks after germination or until grass has become sufficiently established to warrant watering on an “as needed” basis.

f. Seeded areas shall be guaranteed by the Contractor for the specified period (a minimum of one year) or longer if necessary to establish a dense cover as specified above.

2.8 SODDING

A. All sod areas indicated on the plans shall have temporary cover removed, fine graded and sodded as specified herein and in strict accordance with standard horticultural practices

B. Lay sod within 24 hours from time of stripping. Do not plant dormant sod or if ground is frozen.

C. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod strips; do not overlap. The first row of sod shall be laid in a straight line with subsequent rows placed parallel to each other. Lateral joints shall be staggered to promote more uniform growth and strength. Sod is not to be stretched or overlapped. Work from boards to avoid damage to subgrade or sod. Tamp or roll lightly to insure contact with subgrade. Work sifted soil into minor cracks between pieces of sod; remove excess to avoid smothering of adjacent grass.

D. In sloping areas sod shall be laid with the long edges perpendicular to the slope and with staggered joints. In all drainage swales, regardless of the degree of slope, the sod shall be laid with the long edges parallel to the contour lines and with staggered joints.

E. Where sod is indicated on the plans, all slopes greater that 3:1 (horizontal:vertical) and within all drainage swales shall be secured in-place with specified stakes. Stakes shall be placed at intervals no greater than 2'-0" on center, with a minimum of two stakes per piece of sod. Stakes shall be driven into the ground, leaving 2" above the sod line, with the broad face of the stake perpendicular to the slope.

F. As sodding is completed in any one section, the entire area shall be rolled or tamped to insure solid contact of roots with the soil surface. Sod shall be watered immediately after rolling and tamping until the underside of the new sod pad and soil surface below the sod are thoroughly moistened. The operations of laying, tamping and watering for any piece of sod shall be completed within eight (8) hours.

G. Sodded areas shall be guaranteed by the Contractor for the specified period (a minimum of two years) or longer if necessary to establish a dense cover as specified above.

H. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

I. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings.

2.9 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Landscape Architect:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

2.10 MAINTENANCE

A. The Contractor shall maintain sod and seed areas by weeding and mowing as required for healthy growth until issuance of the letter of Substantial Completion for the entire site and scope of work.

B. The Contractor shall be responsible for watering sod and seed areas until the existing irrigation system is repaired and completely functional and the letter of Substantial Completion has been issued. Contractor shall be responsible for watering seed areas by hand where irrigation system does not cover. Hand watering of these areas shall continue until letter of Substantial Completion has been issued. Watering shall supplement natural rainfall and shall assure that the seed areas receive a minimum of one (1) inch of water per week. Seed shall be watered daily during the first week and in sufficient quantities to maintain moist soil to a depth of four inches (4"). After the first week seed shall be watered as necessary to maintain adequate moisture.

END OF SECTION 329200

SECTION 329219 - NATIVE GRASS AND WILDFLOWER SEEDING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Final preparation of topsoil, seeding, herbicide applications and maintenance to specified time limit and mowing.

B. Maintenance.

1.2 RELATED SECTIONS

A. Section 328400 – Automatic Irrigation System, Section 329200 – Turf and Grasses, Section 329300 – Plants

1.3 DEFINITIONS

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horestail, Morning Glory, Rush Grass, Mustard, Lambs quarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel, and Brome Grass.

B. PLS: Pure Live Seed

1.4 MAINTENANCE DATA

A. Maintenance Data: Include maintenance instructions.

1.5 QUALITY ASSURANCE

A. Provide seed in unopened containers certifying percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

B. The seeded areas will be inspected for acceptable coverage and will be acceptable when the grasses designated are growing, are in good condition and no area more than ½ of one percent of the total area shall be bare, or which no single area shall be more than 1 square ft. in area. Any area larger than 1 square ft. shall be reseeded.

1.6 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for leguminous inoculate.

B. Comply with regulatory agencies for handling of “Roundup”, systemic non-selective herbicide.

C. Provide certificate of compliance from governmental authorities indicating approval of seed mixture.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of this project manual.

B. Deliver grass seed to site in original unopened containers. Seed in wet, moldy or otherwise damaged packaging is not acceptable.

C. Deliver leguminous inoculate in original, unopened waterproof containers showing name of manufacturer, expiration date of inoculate, and manufacturer's directions for inoculation.

1.8 COORDINATION

A. Coordinate work with all other construction activities on-site.

PART 2 - PRODUCTS

2.1 IINSTALLER

A. Native Grasses Seed Mix shall be installed by Flick Bros. Seed Company, 1781 NW. 50, Kingsville, MO 64061, Phone No. (816) 597-3822.

B. Or approved equal with at a minimum 10 years experience with seeding native grass mixes. Submit installer name and qualifications for approval

2.2 SEED MIXTURE

A. All seed shall be guaranteed by the vendor to be true to name, origin, purity, germination and percent pure live seed per pound as specified.

B. Where state certification laws and/or applicable federal laws are in force all seed will bear certification of tests acceptable to that state's control agency and shall be free of all noxious weeds. The amount of all other weed seeds shall not exceed one percent.

C. Seed quality chart for grasses shall be submitted to the Owner's Representative for approval with seed test results for the various seeds as supplied by Vendor.

D. All seed species shall be pure clean seed, free of bracts and other plant parts or any other inert materials.

E. Recommended Seed Mixture:
1. Detention Basin/Bio-Swale Seed Mix: Sow seed at rates recommended by supplier. Seed mix #50062 Detention Basin/Bio-Swale Mix Available from Prairie Nursery (prairienursery.com)

2. An approved equal seed mix will be considered. If using an approved equal, submit mixture and supplier name to landscape architect 60 days prior to seeding for approval.

3. See establishment guide at following location. https://www.prairienursery.com/resources-and-guides/seeds-and-seed-mixes/documents/seed-mix-establishment.pdfm

2.3 EQUIPMENT

A. The following items are the preferred equipment for bed preparation and seeding. Requests to use any other equipment deemed necessary or equipment the contractor wishes to use as substitute equipment shall be submitted in writing for the Owner's approval at least 60 days prior to the time of seeding.

B. Use equipment and procedures recommended by seed mix supplier.

2.4 ACCESSORIES

A. Water: In the absence of adequate rainfall, the Contractor may request from the local water authority the approval for water from the on-site or off-site fire hydrants for this work. The Contractor shall pay the local water authority for the cost of the water from the fire hydrants. The Contractor shall provide all needed hoses, sprinkler heads and other appurtenances. If the Contractor provides his own water. It shall not contain any material harmful to plant growth.

B. All other materials not specifically described but required for a complete and proper installation or construction, shall be as selected by the Contractor subject to the approval of the Landscape Architect.

PART 3 - EXECUTION

3.1 EXAMINATION OF SURFACE CONDITIONS

A. Inspections:
1. Prior to all work of this Section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where seeding may commence.
2. Weeds that have emerged or persisted shall be removed by hand or eradicated with an acceptable post-emergent herbicide that is compatible with seeding and approved in writing by the Landscape Architect.
3. Verify that seeding may be completed in accordance with the original design and the referenced standards.

B. Discrepancies
1. In the event of discrepancy, immediately notify the Landscape Architect.
2. Do not proceed with seeding in areas of discrepancy until all such discrepancies have been dully resolved.

3.2 SURFACE PREPARATION

A. Ensure soil surface is smooth and free of dirt clods over 2" diameter.

B. Ensure all rutted areas are flattened and will not hold water.

C. Follow seed supplier's recommendations for surface preparation.

3.3 SEEDING

A. All areas to be seeded with grass seed as indicated on the plan shall be seeded per seed supplier instruction or as approved by landscape architect. Seed with temporary cover crop as specified and in strict accordance with standard horticultural practices

B. Planting Season: Seeding shall be completed between May 15 and July 15. When delays in operations carry the work beyond the most favorable planting season for the grasses designated, or when conditions are such, by reason of drought, high winds, excessive moisture, or other factors, that satisfactory results are not likely to be obtained, the seeding operation shall be stopped and work shall be resumed only when conditions are again favorable, or when approved alternate or corrective measures and procedures have been put into effect and approved by Landscape Architect.

C. Drills to have no-till coulters and press wheels per drop down tube. Native box to implement an agitator to keep seed in suspension while seeding. Drilling of mixture to be installed 1/8 to ¼ inch into soil. Recommended drills are Tye, Truax, or Grasslander drills.

D. If observation shows that areas have been skipped (during seeding operations or after there is a show of green) the sowing of additional seed on these areas shall be required.

E. Do not sow seed immediately following rain, when ground is too dry, or during windy periods.

3.4 MAINTENANCE

A. Begin maintenance immediately after sowing seed.

B. Maintain native grass area until all the following minimum requirements have been met:
   1. For not less than 60 days after substantial completion as determined by the Landscape Architect for the work in this section.
   2. Partial acceptance of native grass areas is not allowable. If not given a full 60 days of maintenance, or if not considered acceptable at that time, continue maintenance until acceptable native seeded area is established.

C. No post-emergent herbicides shall be used after seeding operations.

3.5 CLEANUP AND PROTECTION

A. During seeding operations, keep all areas clean and in an orderly condition. Properly dispose of all resultant dirt, debris and other waste materials.

B. Protect all work and materials from damage due to seeding operations, operations by other contractors and trades, and trespassers. Maintain protection during installation and maintenance periods. Treat, repair, or replace landscape work as directed at no additional cost to the Owner.

3.6 OBSERVATION AND ACCEPTANCE

A. When seeding work is completed, including maintenance, the Landscape Architect will, upon minimum 48 hour notification, make a site visit to determine acceptability of seeding.

B. When observed seeding work does not comply with requirements, replace rejected work and continue specified maintenance until re-observed by the Landscape Architect and found to be acceptable. If the work continues to be unacceptable upon re-observation and additional site visits are required, the Contactor shall pay the Landscape Architect for his time and reasonable expenses for travel to and from the site and other necessary expenses until the work is found to be acceptable.

END OF SECTION 329219

SECTION 329300 - PLANTS

PART 1 - GENERAL

1.1 WORK INCLUDED

A. The Contractor shall furnish all labor, materials, tools, equipment, supervision, and services necessary to install plant material, preparation of soil, fine grading, planting, mulching, guying, pruning, watering, and the proper disposal of any excess earth or debris, all in accordance with the accompanying Drawings and these Specifications.

1.2 SUMMARY

A. Section Includes:

1. Plants.
2. Landscape edging

1.3 RELATED SECTIONS

A. Section 329200 – Turf and Grasses
B. Section 329219 – Native Grass and Wildflower Seeding
C. Section 328400 – Automatic Irrigation System

1.4 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

C. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

1.5 ACTION SUBMITTALS

A. Prior to delivery to the job site, contractor shall submit to the Owner or Landscape Architect the source and supplier of all plant material, fertilizer and mulch, and other materials along with the type of equipment to be used on this project.

B. Product Data: For each type of product.

C. Samples of each type of mulch.

1.6 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Sample warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year.

1.8 QUALITY ASSURANCE

A. Regulatory Requirements
   1. Comply with applicable requirements of Federal, State, and Local laws, regulations and codes having jurisdiction at the project site.
   2. Contractor shall be responsible for certificates of inspection of plant material that may be required by Federal and Local authorities to accompany shipments of plants.

B. Reference Standards
   1. "Standardized Plant Names" by the American Joint Committee of Horticultural Nomenclature.
   2. "American Standard of Nursery Stock" by the American Association of Nurseryman.
   3. American National Standards Institute (ANSI); Publication Z60.1.

C. Substitutions
   1. Substitutions of plant material will not be permitted unless authorized in writing by Owner or Landscape Architect. If proof is submitted that any plant specified is not obtainable, a proposal will be considered for use of the nearest equivalent size or variety with corresponding adjustment of Contract Price. Such proof shall be substantiated and submitted in writing to the Owner and Landscape Architect at least thirty (30) days prior to start of the work under this Section. These provisions shall not relieve the Contractor of the responsibility of obtaining specified materials in advance if special growing conditions or other arrangements must be made in order to supply specified materials.

D. Condition and Source of Plants
   1. Plants shall be subject to review and approval by the Owner or Landscape Architect upon delivery for conformity to Specifications. Such approvals shall not impair the right of review and rejection during progress of the Work. Submit written request for inspection of plant material at place of growth and quantity of plants to be inspected.

E. Coordination
   1. Work in conjunction with other trades as directed, taking all reasonable precautions to avoid disturbance or interference with any other operation or installation on the site. Contractors shall be responsible for the cost of replacing any material damaged as a result of his/her negligence.

F. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

   1. Pesticide Applicator: State licensed, commercial.

G. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Storage of Materials

1. All materials delivered to the job shall be stored so as to keep them in new condition and free from deterioration. Peat moss, fertilizer, etc., shall be stored in temporary sheds off-site at Contractor's expense.

B. Packaged Materials

1. Deliver packaged materials in unopened containers showing weight, analysis, and name of manufacturer. Protect materials from deterioration during delivery and while stored at site.

C. Plant Material

1. Plants shall not be delivered to the site until the corresponding beds are fully prepared. All shipments of nursery materials shall be thoroughly protected from the sun and from drying winds during transit. All plants which cannot be planted at once after delivery to the site of the work shall be well protected against the possibility of drying by wind and sun. Balls of earth on B&B plants shall be kept covered with soil or other acceptable material. All materials heeled-in on the property shall be adequately watered.
2. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.
3. Handle planting stock by root ball.
4. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F until planting.
5. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

D. Review of Stock

1. All planting stock shall be inspected as required by Local, State, or Federal laws, and upon delivery at premises shall be subject to review by the Owner and/or Landscape Architect. All plant material is subject to rejection by the Owner and/or Landscape Architect either at time of delivery or after planting, provided it does not comply with the requirements stated herein. Any rejected stock shall be immediately removed from the premises and replaced with approved stock.

1.10 JOB CONDITIONS

A. Examination of Site:

1. The bidder must acknowledge that he has examined the site, Drawings and Specifications and the submission of a quotation shall be considered evidence that examinations have been made.

B. Field Conditions: The Contractor shall verify drawing dimensions with actual field conditions and inspect related work and adjacent surfaces. The Contractor shall report to the Landscape Architect all conditions which prevent proper execution of this work.

C. The Contractor shall determine the exact location of all existing utilities, structures, and geogrid reinforcement before commencing work. The Contractor shall conduct his work so as to prevent interruption of service or damage to them. The Contractor agrees to be fully responsible for any and all damage which might be occasioned by the Contractor's failure to exactly locate and preserve any and all utilities, structures, and geogrid reinforcement.

1.11 SEQUENCING AND SCHEDULING

A. Planting Time: Proceed with and complete planting as rapidly as portions of the site become available, working within seasonal limitations for each kind of landscape work required.

B. Planting Dates:

1. Trees, shrubs, and perennials shall be planted only when the ground is not frozen, snow covered, or in an otherwise unsuitable condition for planting. Spring planting shall generally occur between April 1 and June 15, and fall planting shall generally occur between August 15 and November 15.

1.12 MATERIALS CLEAN-UP

A. The Contractor shall keep the premises free from rubbish and all debris associated with their work at all times and all unused materials and debris shall be removed from the site.

1.13 WARRANTY

A. All plant material (trees, shrubs, etc.) and planting supplies (bark mulch, etc.) shall be warranted for a period of not less than one (1) year from the date of issuance of the letter of Substantial Completion.

B. All replacement stock shall be subject to the same warranty requirements as the original stock. Any damage due to replacement operations shall be repaired by the Contractor. At the end of the warranty period, inspections shall be made jointly by the Owner, Landscape Architect, and Contractor. All plants not in a healthy growing condition shall be removed and replaced with plants of a like kind and size before the close of the next planting season and before issuance of the letter of Final Completion.

C. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
b. Structural failures including plantings falling or blowing over.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Topsoil shall be fertile, natural topsoil, typical of the locality. Stockpiled topsoil may be used. It shall be free of subsoil, slag, clay, stones, lumps, sticks, plants or their roots, toxic substances or other extraneous matter that may be harmful to plant growth or would interfere with future maintenance. Topsoil pH range shall be 6.0 to 7.0.

B. Soil Testing:

1. Onsite Topsoil – The Contractor shall be responsible for having onsite topsoil tested by the Local County Extension Office to determine the amounts of amendments needed to meet the desired pH, nutritional organic levels determined to be adequate for the area by the County Extension Agent. The Contractor shall submit topsoil tests to the Landscape Architect.
2. Offsite Topsoil - The Contractor shall be responsible for having offsite imported topsoil tested by the Local County Extension Office to determine the amounts of amendments needed to meet the desired pH, nutritional organic levels determined to be adequate for the area by the County Extension Agent. The Contractor shall submit topsoil tests to the Landscape Architect.

C. Soil Conditioners and Amendments:

1. Aluminum sulfate shall be horticultural grade.
2. Peat shall be a natural product of sphagnum peat (peat moss), derived from a fresh-water site conforming to ASTM D 2607 except as otherwise specified. Peat shall be shredded and conditioned in storage piles for at least 6 months after excavation.
3. Sand shall be clean and free of toxic materials.

4. Vermiculite shall be horticultural grade and free of any toxic materials.
5. Rotted manure shall be unleached stable or cattle manure not less than 8 months or more than 2 years old, containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; and containing no chemicals or ingredients harmful to plants. The manure shall be heat treated to kill weed seeds.
6. Rotted sawdust shall have 7.5 pounds of nitrogen added uniformly to each cubic yard and shall be free of chips, stones, sticks, soil, and toxic substances.
7. Gypsum shall be 90 percent pure, free of any toxic materials, and at least 95 percent by weight shall pass a 4-mesh sieve.
8. Other amendments as recommended by County Extension Agent.

D. Treatment of Saline Soil: Saline soil shall be leached out by a controlled amount of water sufficient enough to leach the salts to a level below the root zone. Water used for this purpose shall have a low salt content.

2.2 PLANTING SOIL MIXTURE

A. The “topsoil mixture” shall be composed of on-site or off-site topsoil and additional soil amendments appropriate for the location and plantings based on the soil test provided in the appendix.

B. The “planting soil mixture” for all planting pits shall be 80% topsoil mixture, 10% peatmoss, and 10% well composted manure. Mix thoroughly for uniformity of texture and distribution before placing in pit.

2.3 PLANT STOCK

A. Plant material shall be first quality stock and shall conform to the code of standards set forth in the current edition of the American Standards of Nursery Stock sponsored by the American Association for Nurserymen, Inc.

B. Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Species and variety as specified on the Drawings and delivered to the site shall be certified true to their genus, species and variety and as defined within the current edition of "Standardized Plant Names" by the American Joint Committee of Horticultural Nomenclature.

E. The Contractor shall facilitate inspection and identification by labeling of trees, shrubs, and perennials with a durable waterproof label and weather-resistant ink. Labels shall state the correct plant name and size as specified in the plant list of required plants. Labels shall be securely attached to plants and shall be legible for 60 days after delivery to the planting site. Wire identification tags shall not be used. Plants not labeled will be rejected. The Contractor shall remove all tags after the Landscape Architect’s acceptance of the installation.

F. Plants shall be nursery grown and shall be of varieties specified in the plant list bearing botanical names.

G. Planting stock shall be well-branched and well formed, sound, vigorous, healthy, free from disease, sun-scale, windburn, abrasion, and harmful insects or insect eggs; and shall have healthy, normal unbroken root systems. Deciduous trees and shrubs shall be symmetrically developed, of uniform habit of growth, with straight trunks or stems, and free from objectionable disfigurements. Evergreen trees and shrubs shall have well-developed symmetrical tops with typical spread of branches for each particular species or variety. Evergreen trees and shrubs shall not be sheared. Plants shall have been grown under climatic conditions similar to those in the locality of the project. Deciduous plants shall be dug in a dormant stage only.

H. Stock Sizes: All stock measurements - caliper, height, branching level, number of canes, ball sizes shall be in strict accordance with the latest edition of the American Standard for Nursery Stock, unless otherwise

noted on the plans. Plants used on the project shall meet or exceed all minimum requirements indicated in the size, condition, and remarks sections of the planting legend on the plan sheets.

I. All stock shall be balled and burlapped or container grown stock. Bareroot stock of any kind is unacceptable.

J. All plant material must be watered the same day it is planted in order to comply with these Specifications.

K. All trees shall be staked and guyed as shown on Drawings.

2.4 FERTILIZER

A. All fertilizers shall be horticultural grade complete formula fertilizers and shall conform to the applicable State Fertilizer Laws.

B. Plant Stock: Fertilizer shall be "AGRIFORM" slow release fertilizer tablets. To be applied per manufacturer's specifications. Perennials areas: Fertilizer shall be applied at the same rate as the lawn areas.

2.5 MYCORRHIZAL

A. All mycorrhizal shall be horticultural grade complete formula mycorrhizal and shall conform to the applicable State Mycorrhizal Laws.

B. MYKE Pro Landscape Granular Mycorrhizal Inoculant

1. Distributor: Subject to compliance with requirements, provide products by the following:

2. Arbor Valley Nursery, Brighton, CO, (303) 654-1682, ArborValleyNursery.com

3. For approved equal, reference specific written instructions from manufacturer

2.6 MULCHES FOR PLANTINGS

A. Hardwood Mulch: Mulch in all open planting beds labeled as hardwood mulch shall be shredded double ground oak or dark hardwood mulch of its natural color. Cypress, or dyed or colored mulch is unacceptable. Bark shall be of a relative uniform particle size with a median size of one and one-half inches (1-1/2") and shall be free of sticks, stones, leaves and any other debris.

2.7 EDGING

A. Bed edging adjacent to turf, concrete curb, pavement and sidewalk shall be steel edging per details. Color to be green. Size to 4” x 12’ x 1/8” thick. Manufactured by Sure-loc, Colmet, Reyerson or other approved equal. Submit sample for approval

2.8 GUYING AND STAKING MATERIALS

A. Stakes for tree support shall be steel "T" bar fence post, 8' long, painted dark green with the top 6” painted white.

B. Tree tie systems shall be easily adjustable, strong in all weather, and easily attached and removed. Hose and wire are not acceptable for staked trees. Tree tie systems shall be the following or approved equal:

1. Cinch Ties, J. Lichtenthaler
   P.O. Box 938
   Cerritos, CA 90701
2. Adj-A-Type
   Heavyweight only, plastic chain twist tie
3. A.M. Leonard and Sons
   Piqua, Ohio 43356
   Plastic Binder Tye, tie with tapered beads that snap lock

2.9 TRUNK WRAPPING MATERIAL

A. Tree wrap products

1. Paper tree wrap shall be two thicknesses of crinkled paper cemented together with a layer of bituminous material. Wrapping material shall be a minimum of 4" in width and have a stretch factor of 33 1/3 percent. Twine for tying shall be a grafting cord.
2. 50% white wash latex paint. Product shall be submitted to Landscape Architect prior to contractor applying.

2.10 WATER

A. Water shall not contain elements toxic to plant life. It shall be the Contractor's responsibility to obtain water to be used for watering of plant material.

2.11 ANTI-DESICCANT

A. Anti-desiccant shall be an emulsion that will provide a film over plant surfaces permeable enough to permit transpiration, and not damage the plant.

2.12 HERBICIDES

A. Herbicides used must comply with all applicable State and Federal laws and be registered with the U.S. Environmental Protection Agency.

1. Herbicide control shall be: Pre-emergence application of "Dacthal" or equivalent applied according to manufacturer's recommendations and incorporated into soil as specified. Herbicide shall be in dry/pellet form.
2. Post-emergence application of "Roundup" or equivalent, applied as specified by manufacturer. Use with extreme care to avoid contact with landscape plantings.

2.13 PESTICIDES

A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

PART 3 - EXECUTION

3.1 GENERAL PREPARATION

A. Clearing

1. All planting bed areas are to be cleared by the Contractor.
2. Clearing shall consist of the satisfactory removal and disposal of brush, rubbish, and other vegetative growth occurring within all planting bed areas. All debris associated with this work shall be gathered and removed from the project by the Contractor.

B. Preparation of Planting Soil Mixture

1. Mix recommended soil amendments and fertilizers with topsoil at rates recommended by the soil test results. Delay addition of fertilizer if planting mixture will not be used within two (2) days.

C. Protection of Existing Vegetation

1. All areas under drip lines of existing trees shall be kept free of construction equipment, trailers, material storage, and vehicles.

2. Exercise extreme care when working around existing trees to remain. No soil scarification or compaction from construction vehicles shall occur under any existing tree dripline.
3. In areas of established turf, the surrounding turf area shall be covered in a manner that will provide protection before excavations begin.

3.2 TREE, SHRUB, AND PERENNIAL PLANTING

A. All planting shall be performed by personnel familiar with the accepted procedure of planting and under the constant supervision of a qualified planting foreman.

B. All planting is to be done as shown on drawings and as specified herein and in strict accordance with standard horticultural practices.

C. Layout

1. Plant material locations and planting bed outlines shall be staked on the project site by the Contractor and approved by the Owner or Landscape Architect before any plant pits or beds are excavated. Plant material locations and bed outlines may be adjusted by the Landscape Architect to meet field conditions.

D. Installation of Trees and Shrubs

1. Planting pits shall be excavated to produce vertical sides and flat bottoms. Scarify side walls to alleviate glazing and loosen any hard subsoil in bottom of pit. Minimum pit sizes shall be as shown on drawings. Tree pits within parking lot islands shall be excavated per detail removing existing soil to depth shown prior to gravel and geotextile placement.
2. Dispose of all subsoil, clay, and rock (off-site) removed from planting excavations. The top six (6) inches of topsoil excavated from the planting pit, if free from subsoil, clay, rocks, roots, or other debris, may be utilized in the topsoil mixture as specified.
3. Setting Plants
    a. Balled and burlapped and container grown plants shall be handled and moved only by the ball or container. Plants shall be set plumb and held in position until a sufficient quantity of planting soil mixture has been firmly placed around roots or ball. Plants shall be set in relation to surrounding grade so that they are 2" higher than the depth at which they are grown in the nursery, collecting field, or container. Fertilizer in tablet form shall be placed prior to backfilling and in accordance with the manufacturer's specifications. Mycorrhizal
    b. Apply Mycorrhizal to the top 2/3 of root balls of all plant material according to the manufacturer's recommended rates. Inoculant must be physically rubbed onto the root ball thoroughly prior to backfilling planting hole. There is no restriction for use of slow release fertilizers with Mycorrhizal inoculant.
    c. Balled and bur lapped stock shall be backfilled with the specified planting soil mixture to approximately half the depth of the ball and then tamped and watered. Burlap and tying materials shall be carefully removed or opened and folded back from top 1/3 of root ball. The remainder of backfill of planting soil mixture shall be tamped and watered.
    d. Container-grown stock shall be removed from containers without damaging plant or root system. Planting shall be completed as specified for balled or burlapped plants.
4. Edging Planting Beds
    a. All planting beds shall be edged with steel edging as indicated on the drawings.
5. Mulching (Hardwood)
    a. Prior to the installation of mulch, all areas to be covered shall be weed free and treated with the specified pre-emergent herbicide as specified herein.
    b. Mulch for planting beds shall be installed to a minimum depth of three inches (3") in all planting bed areas specified on the Drawings. Mulch for all tree plantings shall be three inches (3") in depth.
    c. Mulching shall take place within 48 hours after planting.

d. Mulch shall be kept out of the crowns of shrubs and off walls, sidewalks, light standards, and other structures.
e. The top of all areas covered with of mulch shall be 1" below the top of adjacent curb, walk, wall, wall cap, or edge of pavement.

6. Staking and Guying
   a. Plants shall be staked and guyed as indicated on plans within 24 hours of planting.
   b. Stakes shall be driven vertically into the ground to a depth specified in details and in such a manner as not to damage the ball or roots.
   c. Tree tie systems shall be installed as per manufacturer's specifications.
   d. All trees two and one half inches (2 1/2") caliper or less shall be staked with two metal "T" stakes. All trees greater than two and one half inches (2 1/2") caliper shall be staked with three metal "T" stakes, spaced equal distant around the tree.
7. Wrapping: The trucks of deciduous trees shall be wrapped within 24 hours after planting. Contractor shall coordinate with Landscape Architect which trees get wrapped or white wash prior to completion.
   a. Tree Wrap: The wrapping shall be securely tied with grafting cord at the top and bottom and at 24" maximum intervals.
   b. White Wash: Apply 50% white latex paint 50% water mix to trunk
8. Pruning: The Contractor shall prune new plant material in the following manner: Dead and broken branches shall be removed. Evergreen plants shall not be thinned out or sheared. Shrubs shall not be sheared. All plants shall meet or exceed the minimum requirements indicated in the size, condition, and remarks sections of the planting legend on the plan sheets after pruning has taken place. Cuts shall be made with sharp instruments, and shall be flush with trunk or adjacent branch to insure elimination of stubs. "Headback" cuts at right angles to line of growth shall not be permitted. All trimmings shall be removed from the site.

3.3 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape trees, shrubs, and vines as directed by Landscape Architect.

C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Landscape Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

D. Do not apply pruning paint to wounds.

3.4 PLANT MAINTENANCE

A. The Contractor shall maintain trees, shrubs, and other plants by pruning, cultivating, and weeding as required for healthy growth until issuance of the letter of Substantial Completion for the entire site and scope of work. The Contractor shall tighten and repair stake and tree tie systems, reset trees and shrubs to proper grades or vertical position, restore or replace damaged wrappings, and apply herbicides and pesticides to keep trees, shrubs, and other plant material free of insects and disease as required until issuance of the letter of Substantial Completion.

B. The Contractor shall be responsible for watering trees, shrubs, and other plant material until the irrigation system is completely functional and the letter of Substantial Completion has been issued. Contractor shall be responsible for watering trees by hand where irrigation system does not cover. Hand watering of these trees shall continue for 90 days after letter of Substantial Completion has been issued. Watering shall

supplement natural rainfall and shall assure that the trees, shrubs, and other plant material receive a minimum of one (1) inch of water per week. Seed shall be watered daily during the first week and in sufficient quantities to maintain moist soil to a depth of four inches (4"). After the first week seed shall be watered as necessary to maintain adequate moisture.

END OF SECTION 329300

SECTION 329301 – INTERIOR PLANTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plants.
2. Plant Containers.

1.2 DEFINITIONS

A. Planting Soil: Imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See drawing for planting soils descriptions.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1.5 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Sample warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year.

1.7 QUALITY ASSURANCE

A. Installer's Personnel Certifications: Landscape Industry Certified Interior.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Handle planting stock by root ball.

B. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F (16 to 18 deg C) until planting.

C. Deliver plants after preparations for planting have been completed and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1.9 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.

2. Warranty Periods: From date of Substantial Completion.

a. Vines, and Ornamental Grasses: 12 months.
b. Ground Covers, Biennials, Perennials, and Other Plants: 6 months.
c. Annuals: 3 months.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features as indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

B. Annuals and Biennials: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to indoor conditions before delivery and that are in bud but not yet in bloom.

2.2 CONTAINERS

A. Provide linear premanufactured plant containers as indicated on the drawings.

2.3 FERTILIZERS

A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: 5-gram tablets.
2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

PART 3 - EXECUTION

3.1 PLANT PLANTING

A. Use planting soil in linear containers.

B. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

C. Water thoroughly after planting, taking care not to over water plant with wet soil.

3.2 MAINTENANCE SERVICE

A. Maintenance Service: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:

1. Maintenance Period for Plants: Six months from date of Substantial Completion.

END OF SECTION 329301