



**BOX REAL ESTATE DEVELOPMENT
NEW LONGVIEW – LOT 44
MULTI-TENANT SHELL**

Issue Date: 2024

NOTE: This Table of Contents is for convenience only. Its accuracy and completeness are not guaranteed. In case of discrepancy between this Table of Contents and Specification Sections referenced herein, the Specification Sections shall govern.

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1.1 DEFINITIONS

- A. Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Contract Documents, submitted following Contract award. See Section 012500 "Substitution Procedures" for conditions under which Substitution requests will be considered following Contract award.

1.2 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.

1.3 PROCUREMENT SUBSTITUTIONS

- A. Procurement Substitution Requests will be received and considered by Owner when the following conditions are satisfied, as determined by Architect; otherwise requests will be returned without action:
 - 1. Extensive revisions to the Contract Documents are not required.
 - 2. Proposed changes are in keeping with the general intent of the Contract Documents, including the level of quality of the Work represented by the requirements therein.
 - 3. The request is fully documented and properly submitted.

1.4 SUBMITTALS

- A. Procurement Substitution Request: Submit to Architect. Procurement Substitution Request must be made in writing in compliance with the following requirements:
 - 1. Submittal Format: Submit three copies of each written Procurement Substitution Request, using CSI Substitution Request Form 1.5C.
 - a. Identify the product or the fabrication or installation method to be replaced in each request. Include related Specifications Sections and drawing numbers.
 - b. Provide complete documentation on both the product specified and the proposed substitute, including the following information as appropriate:
 - 1) Point-by-point comparison of specified and proposed substitute product data, fabrication drawings, and installation procedures.
 - 2) Copies of current, independent third-party test data of salient product or system characteristics.
 - 3) Samples where applicable or when requested by Architect.
 - 4) Detailed comparison of significant qualities of the proposed substitute with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
 - 5) Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
 - 6) Research reports, where applicable, evidencing compliance with building code in effect for Project, from ICC-ES.
 - 7) Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, which will become necessary to accommodate the proposed substitute.
 - c. Provide certification by manufacturer that the substitute proposed is equal to or superior to that required by the Procurement and Contracting Documents, and that its in-place

performance will be equal to or superior to the product or equipment specified in the application indicated.

- d. Contractor, in submitting the Procurement Substitution Request, waives the right to additional payment or an extension of Contract Time because of the failure of the substitute to perform as represented in the Procurement Substitution Request.

B. Architect's Action:

1. Architect may request additional information or documentation necessary for evaluation of the Procurement Substitution Request. Architect will notify contractor of the status of the proposed substitute.

- C. Architect's approval of a substitute does not relieve Contractor of the responsibility to submit required shop drawings and to comply with all other requirements of the Contract Documents.

END OF DOCUMENT 002600

1.1 FORM OF AGREEMENT AND GENERAL CONDITIONS

- A. The following form of Owner/Contractor Agreement and form of the General Conditions shall be used for Project:
 - 1. AIA Document A101, "Standard Form of Agreement between Owner and Contractor, Stipulated Sum."
 - a. The General Conditions for Project are AIA Document A201, "General Conditions of the Contract for Construction."
 - 2. The General Conditions are incorporated by reference.
 - 3. The Supplementary Conditions for Project are incorporated into a modified copy of the General Conditions included in the Project Manual.
 - 4. Owner's document(s) bound following this Document.

1.2 ADMINISTRATIVE FORMS

- A. Administrative Forms: Additional administrative forms are specified in Division 01 General Requirements.
- B. Copies of AIA standard forms may be obtained from the American Institute of Architects; <http://www.aia.org/contractdocs/purchase/index.htm>; docspurchases@aia.org; (800) 942-7732.
- C. Preconstruction Forms:
 - 1. Form of Performance Bond and Labor and Material Bond: AIA Document A312, "Performance Bond and Payment Bond."
 - 2. Form of Certificate of Insurance: AIA Document G715, "Supplemental Attachment for ACORD Certificate of Insurance 25-S."
- D. Information and Modification Forms:
 - 1. Form for Requests for Information (RFIs): AIA Document G716, "Request for Information (RFI)."
 - 2. Form of Request for Proposal: AIA Document G709, "Work Changes Proposal Request."
 - 3. Change Order Form: AIA Document G701, "Change Order."
 - 4. Form of Architect's Memorandum for Minor Changes in the Work: AIA Document G707, "Architect's Supplemental Instructions."
 - 5. Form of Change Directive: AIA Document G714, "Construction Change Directive."
- E. Payment Forms:
 - 1. Schedule of Values Form: AIA Document G703, "Continuation Sheet."
 - 2. Payment Application: AIA Document G702/703, "Application and Certificate for Payment and Continuation Sheet."
 - 3. Form of Contractor's Affidavit: AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
 - 4. Form of Affidavit of Release of Liens: AIA Document G706A, "Contractor's Affidavit of Payment of Release of Liens."
 - 5. Form of Consent of Surety: AIA Document G707, "Consent of Surety to Final Payment."

END OF DOCUMENT 006000

PART 1 - GENERAL

GENERAL CONDITIONS: AIA Document A 201-1997 Edition: "General Conditions of the Contract for Construction" - consisting of 14 Articles, is hereby included as a part of the Contract Documents by reference. Copies are available from the office of the Architect, and from the American Institute of Architects.

The following "Supplementary Conditions" modify the "General Conditions" as if originally written therein. 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. The General Conditions may also be modified elsewhere in the Contract Documents by provisions located in other Sections of the Specifications.

ARTICLE 1 - CONTRACT DOCUMENTS

ADD to paragraph 1.2, CORRELATION AND INTENT . . . the following:

"1.2.4 Notes written in the imperative mood refer to action(s) to be performed by the Contractor, the words 'the Contractor shall' are always implied, unless otherwise noted within the Construction Documents.

1.2.5 Figured dimensions and marked data shall take precedence over scaled measurements, and details shall take precedence over smaller scale general drawings."

1.2.6 In case of conflict in or between contract requirements (General and Supplementary Conditions), General Requirements (Division-1 Specification Sections), Drawings, Specifications or manufacturer's product requirements, the Contractor will be deemed to have estimated on, and have agreed to provide, the greater quantity, and better quality, of materials and/or work.

1.2.7 If Work is required in conditions making it impossible to execute in a reasonably acceptable manner considering normal industry trade-practices, request an interpretation and clarifications from the Architect before proceeding. If no request is made, no excuses will be subsequently entertained for performance of unacceptable Work."

REPLACE Paragraph 1.5.2 with the following:

"1.5.2 Execution of the Contract by the Contractor is a representation that the Contractor has carefully examined and understands the intent of the Contract Documents, that the Contractor has visited the project site and has thoroughly reviewed the conditions under which the Work will be performed (including but not necessarily limited to labor availability, codes and regulations, hazards, procedures, construction means and methods necessary and weather conditions), and that he/she has correlated his/her personal observations with the requirements of the Contract Documents. No claims will be approved for additional time or costs resulting from the Contractor's lack of familiarization as required herein."

ADD to Paragraph 1.6 - OWNERSHIP AND USE OF DRAWINGS . . . the following:

"1.6.2 If the Contractor obtains any Drawings in electronic media format from the Architect or the Architect's consultants, the Contractor hereby agrees to the following conditions:

1.6.2.1 Electronic media files are considered "Instruments of Service" by the Architect or the Architect's consultants, and the Architect or the Architect's consultants retain all common law, statutory law and other rights, including the copyright. The transfer of electronic media is not considered a sale by the Architect of tangible goods, and neither the Owner or the Architect or the Architect's consultants makes any warranties, express or implied, of merchantability or of fitness for a particular purpose of the electronic media data.

1.6.2.2 No representation is made regarding the accuracy or completeness of electronic media data. Electronic media data may represent only a portion of the Construction Document information and, as such, it may be incomplete. Electronic media files are not to be considered as official Construction Documents, as differences may exist between the electronic file data and the corresponding hard-copy, signed, sealed and approved Construction Documents used for the project's construction.

1.6.2.3 Any transfer or translation of electronic media data from one computer to another can result in loss of important information and the Contractor assumes that risk. Further, the Contractor understands that the Contractor is responsible for any translation or modification of the electronic media data necessary for use by the Contractor.

1.6.2.4 The Contractor will not use the Electronic Media data for any purpose other than preparation of shop drawings, coordination drawings, or Record Drawings for this Project. The Contractor agrees not to transfer the electronic media data to any entity not involved in the construction Work without the prior written consent of the Architect. The Contractor further agrees to waive all claims against the Owner, the Architect, or the Architect's consultants resulting in any way from any use of the use of the electronic media data. Use of electronic media data

2 does not reduce or minimize in any way the Contractor’s responsibility to take field measurements, check
3 dimensions, and to coordinate with other construction work at the Project Site.

4 1.6.2.5 Use of electronic media data will be at the Contractor's sole risk and without any liability, risk or legal
5 exposure to the Owner or Architect or Architect’s consultants.

6 1.6.2.6 The Contractor hereby agrees to waive and release all claims or potential claims against the Owner, the
7 Architect, The Architect’s consultants, and their respective officers, directors, employees, and agents relating to, or
8 arising out of, the use of electronic media data, by reason of any act or omission of such parties, under any legal
9 theories whatsoever, specifically including the negligence of any party, and including costs for defense.

10 1.6.2.7 In addition, the Contractor will require all subcontractors or suppliers to whom the Contractor furnishes the
11 electronic media data to sign an identical copy of these terms and conditions. For any party who does not agree in
12 writing to such terms and conditions, the Contractor hereby agrees to defend, indemnify and hold harmless the
13 Owner, the Architect and the Architect’s consultants from all claims, suits, expense, damages or loss, including
14 attorney's fees, arising out of Contractor's furnishing such data to third parties.”
15

18 **ARTICLE 2 - OWNER**

19 *DELETE the first two (2) sentences of Paragraph 2.4.1 and ADD the following:*

20 “If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails
21 within a seventy-two (72) hour period after receipt of written notice from the Owner to commence and continue
22 correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other
23 remedies the Owner may have, correct such deficiencies.”

24 *ADD to Paragraph 2.2.5. the following:*

25 “The Owner will provide one (1) printed set of Drawings and Specifications to the Contractor. Additional copies of
26 Drawings and Specifications may be made by the Contractor at no additional cost to the Owner.”

28 **ARTICLE 3 - CONTRACTOR**

29 *ADD to Paragraph 3.1 - GENERAL, the following:*

30 "3.1.4 DUTY OF COOPERATION: Issuance of the Construction Documents to the Contractor implies and
31 anticipates continuing and periodic communication between the Contractor and the Architect. Failure to
32 communicate or otherwise notify the Architect of discrepancies or changes made to the project relieves the Architect
33 of responsibility for consequences of such changes.
34

35 *ADD to Paragraph 3.2 the following:*

36 “3.2.4 Submission of any bid or proposal for the Work of this Project is deemed as a representation that the entity
37 has examined the premises and has satisfied itself as to existing site conditions under which that entity will be
38 obliged to operate. No additional costs for labor, materials or equipment will be allowed for failure to fully examine
39 the site.
40

41 3.2.5 Geotechnical information will be made available to the Contractor. The Contractor is to comply with the
42 recommendations of the geotechnical report unless otherwise indicated by the Owner. In the event of conflicting
43 recommendations or several optional methods in such report(s), the Contractor shall submit those options to the
44 Architect in writing. The Contractor shall obtain written clarification from the Architect regarding any conflicting
45 geotechnical recommendations before starting that portion of the Work.”

46 *ADD to Paragraph 3.4.2 the following:*

47 "3.4.2.1 After the Contract has been executed, the Owner will consider written requests for substitution of products
48 in place of those specified only under the conditions set in the General Requirements (Division 1 of these
49 Specifications).
50

51 3.4.2.2. By making requests for substitutions based on Subparagraph 3.4.3 above, the Contractor: (.1) represents that
52 he has personally investigated the proposed substitute product and determined that it is equal or superior in all
53 respects to that specified, (.2) represents that the Contractor will provide the same warranty for the substitution that
54 the Contractor would have provided for the specified product, (.3) certifies that the cost data presented is complete
55 and includes all related costs under this Contract except the Architect's redesign costs, and waives all claims for
56 additional costs related to the substitution which subsequently become apparent; and (.4) will coordinate the
57
58

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

ADD to Paragraph 3.5 the following:

"3.5.2 The Contractor's warranty required in Paragraph 3.5.1 does not replace, change or otherwise limit any statutory warranty rights of the Owner, or any other Contract requirements. Such warranty is not limited to one (1) year as it is to be governed by the applicable statute of limitations for breach of contract.

3.5.3 The Contractor's contractual obligation to correct Work as defined in Paragraph 12.2 does not limit the Contractor's liability under any applicable statute of limitations, or limit any longer warranty periods required by the Contract Documents, and does not waive any of the Owner's rights under Paragraph 3.5.1 or elsewhere in the Contract Documents or as otherwise provided by law.

3.5.4 It is hereby understood that the failure of any piece of equipment, material, or service provided in this Contract to pass the applicable inspection by Owner and Architect and by any public authorities will constitute a default in performance and that the Contractor warrants that in the event of such failure, it will cause same to be corrected expeditiously and in a manner acceptable to such authorities and to the Owner. If the Contractor does not provide corrections within thirty (30) days after written notice of the default condition, the Owner may provide the corrections and charge the Contractor for all costs incurred plus a ten percent (10%) administrative fee or \$500, whichever is greater.

3.5.5 The Contractor's usual warranties (express and implied) shall remain in full force and effect even if a material or equipment item is required by the Owner to be manufactured by a specific entity, and no other acceptable equivalent product manufactured by any other entity is acceptable."

ADD to subparagraph 3.7.1 the following:

"3.7.1.1 The Contractor shall pay for all hook-up charges, 'tap-in' fees, permits and other related expenses related to the construction and full connection or hook-up of all utilities."

ADD to Paragraph 3.10 the following:

"3.10.4 In the event that the Contractor fails to adhere to the schedule, the Contractor will furnish such additional labor and/or services, or work sufficient overtime as may be necessary to make progress conform to the schedule. Failure to adhere to the schedule, or failure to take steps to regain the schedule, shall constitute default within the terms of the Contract."

ADD to Paragraph 3.12.10 the following:

"3.12.10.1 The Contractor will require that any entity engaged to provide design services per Paragraph 3.12.10 will maintain Professional Liability Insurance with minimum limits of \$1,000,000 per claim and annual aggregate. Insurance coverage must be maintained not less than one (1) year after Substantial Completion. The Contractor shall provide the Architect with a Certificate of Insurance evidencing coverage prior to performance of services."

ADD to Paragraph 3.15.2 the following:

"Clean-up costs paid by the Owner will be deducted from the Contract Sum if the Contractor fails to respond to the Owner's notice (forwarded via email) within twenty-four (24) hours."

ADD to Paragraph 3.18 the following:

"3.18.3 The indemnitees of Paragraph 3.18.1 will include the Owner, the Architect, the Architect's consultants, and agents and employees of any of them. In addition to the indemnity provided by paragraph 3.18.1, the Contractor shall indemnify and hold harmless the indemnitees from and against claims, damages, losses, liabilities and expenses, including attorney's fees, in the nature of economic loss, damage to the Work itself, and administrative or civil fines and penalties, which the indemnitee suffers or incurs as a result of the acts, errors or omissions of Contractor, its Subcontractors, suppliers of any tier, their agents and employees. Any indemnitee who incurs attorney's fees and legal costs in any action to enforce the Contractor's indemnity obligations shall be entitled to recover the same from the Contractor.

3.18.4 The Contractor agrees to require all Subcontractors performing Work on this Project to include in their contracts with the Contractor a provision requiring the Subcontractors to indemnify and defend the Owner and Architect for any claims arising out of the negligence or breach of contract by the Subcontractors or their employees."

ARTICLE 4 - ADMINISTRATION OF THE CONTRACT

OWNER ADMINISTRATION OF CONSTRUCTION CONTRACT: REVISE Article 4 from Paragraph 4.2, through Paragraph 4.6 inclusive, by substituting the word "Owner", wherever the word "Architect" is used, as the Owner will administer the Construction Contract.

ARCHITECT'S LIMITED-SCOPE CONSTRUCTION ADMINISTRATION SERVICES: The Architect's services during construction may be "limited" to a specific hourly maximum, or on an "as-needed" basis upon the Owner's request. As the services of the Architect are intended solely for the benefit of the Owner, the Contractor may not rely upon performance of Architect's services. In instances when the Architect is not involved, REVISE Article 4 from Paragraph 4.2, through Paragraph 4.6 inclusive, by substituting the word "Owner", wherever the word "Architect" is used."

REVISE the next to the last sentence of Paragraph 4.2.7 to read as follows:

"The Architect's review does not constitute approval of safety precautions or, unless otherwise specifically agreed to in writing, signed by the Architect, with specific reference to the submittal, of any construction means, methods, techniques, sequences or procedures."

ADD to Paragraph 4.3.7.1 the following:

"Notice of the Contractor's intent to make a claim for additional time must be received by the Architect within seven (7) days of commencement of the event or condition forming the basis for the claim."

ADD the following to Paragraph 4.3.7.2:

"Extensions of time for adverse weather conditions will not considered as a justification for additional compensation to the Contractor for administrative or other 'office overhead' expenses."

DELETE paragraph 4.3.10 and replace as follows:

"4.3.10 The Contractor will be liable to Owner for all direct and indirect, including consequential, damages caused by Contractor's negligence or by its breach of contract, warranty or other actionable conduct. Consequential damages to Owner shall include, but are not limited to, damages for lost revenue or income, rental expenses, loss of use, lost profit, financing and interest charges, damage to business or reputation, loss of management or employee productivity or lost services of such persons."

ADD the following Paragraph 4.7:

"4.7 DEDUCTIONS FOR COSTS OF ARCHITECT'S ADDITIONAL SERVICES:

4.7.1 THE CONTRACTOR WILL BE RESPONSIBLE for costs incurred by the Owner for the additional services of the Architect and its consultants due to the following:

- .1 Review of Submittals after an initial review and one (1) re-submittal review;
- .2 Responses to Contractor's requests for information when the information was available to the Contractor from careful study and comparison of the Contract Documents, field conditions, or prior project correspondence;
- .3 Evaluation of substitutions proposed by the Contractor and subsequent modifications to the Construction Documents resulting from such substitutions;
- .4 Additional Site Observation visits due to defects in the Work by the Contractor, or due to the failure of the Contractor to meet the project schedule;
- .5 Substantial Completion observations and reports beyond one (1) initial observation and one (1) follow-up observation and report.

4.7.2 THE OWNER WILL DEDUCT the above fees and expenses after submitting a Claim to the Architect for approval by Change Order, without the Contractor's signature or approval. The Contractor may contest any deduction by making a Claim in accordance with Article 4."

ADD the following Paragraph 4.4.9:

"4.4.9 During resolution of any dispute, the Contractor agrees to continue performance of the Work pending resolution. Failure to proceed will constitute a material breach of the Contract, regardless of the ultimate decision on the dispute, it being understood and agreed that any controversy between the parties shall not be deemed a basis to delay or suspend the work, unless agreed to in writing by Owner."

ARTICLE 6 – CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

ADD to Paragraph 6.1 the following:

“6.1.5. This Contractor is not responsible for the control or management of Separate Contractors, and the Owner releases this Contractor from any liabilities related to work by Separate Contractors. The Owner will require Separate Contractors to provide liability insurance equal to that required for this Contract before starting any work at the project site. Separate Contractors will be required to comply with all safety requirements established by this Contractor (as applicable), and will not be allowed to interfere with this Contractor’s construction operations.”

ARTICLE 8 – TIME

Delete Subparagraph 8.3.3 in its entirety.

ADD the following to Paragraph 8.3 – Delays and Extensions of Time:

“8.3.5 The Owner may direct Contractor to work overtime, and to accelerate the Work, and if so instructed, Contractor agrees to work overtime and accelerate the Work. If such direction is not due to causes within the Contractor's control, the Owner agrees to pay for overtime and accelerated Work, but only for related overtime charges which shall consist of the premium or extra hourly wage incurred by the Contractor only. No insurance, taxes, overhead or profit shall be paid by Owner based on any premium wage paid. Written authorization for payment of overtime charges must be received by the Contractor from the Owner in writing prior to performing the Work.

8.3.6 Normal inclement weather and associated site conditions will not be considered as a valid cause for delay of the Work, as it is anticipated that the Contractor will estimate sufficiently for work stoppages due to reasonably anticipated inclement weather within the Construction Schedule.

8.3.7 Notwithstanding the foregoing, if Contractor is delayed in the performance or progress of the Work by Abnormal Weather Conditions (as defined herein) then the Contractor will be entitled to an extension of the completion date for the impacted portion of the Work provided the Contractor makes claim not more than seven (7) days after the cause of the delay begins. “Abnormal Weather Conditions” are hereby defined as temperature and precipitation that are abnormal for the location of the Work as determined by the National Climatic Data Center, Asheville, North Carolina, based on the previous ten (10) year mean for the Work location. Abnormal Weather Conditions and causes beyond the control of the Contractor which delay the work, including but not limited to catastrophic weather events, fire or vandalism, theft, actions or stoppages by public officials, shall extend the completion date by equal periods of time as the delay impacts the critical path of the Construction Schedule, provided the Contractor makes claim not more than seven (7) days after the cause of the delay begins and provides proof of impact on the critical path Work, which is not concurrent with a Contractor-caused delay.

8.3.8 To qualify as an adverse weather day, weather conditions or related site conditions must prevent Work on critical path activities for 50 percent or more of the Contractor's scheduled work day”.

ARTICLE 9 - PAYMENT AND COMPLETION

ADD to Subparagraph 9.3.1, the following:

“9.3.1.3 The Owner will retain ten percent (10%) of the amount of each progress payment application until fifty percent (50%) of the Work has been completed. When the Project reaches 50% completion as determined by the Architect, and only if the character and progress of the Work are satisfactory to the Owner and the Architect, the Owner may waive additional retainage for the balance of the Contract, upon recommendation of the Architect and with the concurrence of the Contractor’s surety (if any).

9.3.1.4 Funds retained during the initial 50% of the Project shall be held by the Owner until Substantial Completion. If, after 50% completion, the Contractor's performance at any time is deemed deficient by Owner, the Owner reserves the right to reinstate the full ten percent (10%) retainage for the balance of the Project.

9.3.1.5 Upon Substantial Completion, and with the concurrence of the Architect and the Contractor’s surety (if any), retainage may be reduced to an amount equal to 200% of the value of the Work remaining to be completed, including defective work not yet remedied (whether covered by a warranty or not) and Work yet to be performed or completed, plus an amount sufficient to protect the Owner for liquidated damages or other charges, liens or offsets due the Owner.”

ADD the following to Paragraph 9.3 – Applications for Payment:

“9.3.4 LIENS

9.3.4.1 If the Contractor has received payment for labor or materials and if a lien is subsequently filed by any Subcontractor claiming an interest in that labor or materials, and if same has not been released or insured over by the Owner's title company or bonded over by the Contractor within ten (10) days following the recording or filing of such Lien, the Contractor hereby authorizes and consents to an automatic deduction from the Contract Sum ("Lien Deduct Amount") in the sum of 150% of the Lien amount. Following such automatic Lien Deduct Amount, the Contractor acknowledges and agrees that the Owner may, at the Owner's sole option and discretion, have the right to: (a) place all or a portion of the Lien Deduct Amount in escrow with its title company and subsequently pay the Lien to the Lien claimant, including all accrued interest and penalties; or (b) immediately pay the Lien amount, including any accrued interest and penalties, to the Lien claimant.

9.3.4.2 The Contractor will have the right to contest and defend the Owner at the Contractor's sole expense, from and against any Lien which the Contractor contests in good faith. If the Contractor identifies qualified legal counsel to provide such defense and specifies the good faith reason to dispute the Lien, then the Owner agrees to hold the Lien Deduct Amount in escrow and not to exercise the Owner's right to pay the Lien pending resolution of such Lien claim and dispute. The Lien Deduct Amount is for the Owner's sole protection and is not for the benefit of the Contractor or any surety. The Owner may apply the Lien Deduct Amount in whole or in part to offset Owner's legal costs and to protect itself against the risk of paying twice for Work for which Contractor has been paid, and for improper claims asserted by Lien claimants.

9.3.4.3 The Contractor agrees and acknowledges that the Lien Deduct Amount, including any amount above the Lien amount paid, including all interest and penalties, shall be retained by Owner until satisfactory resolution of such Lien without risk to the Owner or the Owner's property. If such Lien is not released, bonded or insured, and not fully and successfully defended by Contractor, the Owner may accept the full Lien Deduct Amount as liquidated damages. The parties recognize and agree that it would be extremely difficult to ascertain the extent of actual costs, expenses, time and damages associated with the recording of a mechanic's lien on the Property, and that any and all Lien Deduct Amounts above the Lien amount, including any and all interest and penalty, represents as fair an approximation of the actual cost, expense, time and damage associated with resolving any Lien issues as the parties can now determine."

DELETE and replace Paragraph 9.6.3 (and the reference to that paragraph in 9.6.5) with the following:

"9.6.3 The Architect will have no obligation to furnish information to subcontractors. All communication from subcontractors to Architect shall be forwarded through the Contractor."

ADD the following new Paragraph 9.11:

"9.11 OWNER'S DIRECT PAYMENT TO SUBCONTRACTORS AND MATERIAL SUPPLIERS

9.11.1 The Owner reserves the right to make direct payments to any subcontractor or material supplier and to deduct such amounts from the Contract Sum due to the Contractor or to make payments jointly to the Contractor and to the Subcontractor as the Owner determines necessary to protect the Project Site from any liens.

9.11.2 The Owner is not obligated herein to make any direct payments to a Subcontractor or material supplier, and such payments do not create any obligation to make further payments to any Subcontractor or material supplier."

ARTICLE 11 - INSURANCE & BONDS

ADD to Subparagraph 11.1.1 the following:

"11.1.4 Liability insurance shall include all major divisions of coverage and shall be on a comprehensive basis with specified limits listed below maintained specifically for this project. Coverages shall include: Personal Injury Liability with Employment Exclusion deleted, Contractual, including specified provisions for Contractor's obligation under Paragraph 3.18, Owned, non-owned and hired motor vehicles, and Broad Form Property Damage coverage. Premises-Operations, Independent Contractor's Protective, Products and Completed Operations, Owner's & Designers Protective Liability, and Broad Form Property Damage coverage. Property Damage Liability coverage shall provide X, C, and U coverages, with Completed Operations and Products Liability coverage maintained for two (2) years after final payment. The following minimum limits are applicable to each incident occurrence as well as for the total annual aggregates - which shall be dedicated specifically for this project only. Minimum coverage amounts shall be as listed below, or as required by law, whichever is greater:

	General Contractor	Sub-contractors
Worker's Comp. & General Employer's Liability:	\$ 500,000.00	\$ 500,000.00
Comprehensive General Liability, Owners & Contractor's Protective Liability, and Independent Contractors Protective Liability:		
Property damage:	\$ 5,000,000.00	\$ 1,000,000.00
Bodily injury:	\$ 5,000,000.00	\$ 1,000,000.00
Contractual Liability:		
Property Damage:	\$ 5,000,000.00	\$ 1,000,000.00

	Bodily injury:	\$ 5,000,000.00	\$ 1,000,000.00
2	Comprehensive Automobile Liability:		
	Property Damage:	\$ 1,000,000.00	\$ 500,000.00
4	Bodily injury:	\$ 1,000,000.00	\$ 500,000.00

6 11.1.5 Any person engaged in construction Work at the site must be covered under applicable Workmen's
8 Compensation insurance, either through the General Contractor's own policy, or that of appropriate sub-contractors."

8 ***ADD to Subparagraph 11.1.3, the following:***

10 "11.1.3.1 All certificates of insurance required herein shall name the Owner and the Architect as additional insured."
12 ***DELETE Paragraph 11.3 - Project Management Protective Liability Insurance, in its entirety.***

14 ***DELETE Subparagraph 11.4.1.3 and ADD the following:***

16 "11.4.1.3 The Contractor's responsibility for payment of the deductible amount on the Owner's Property Insurance
18 (Builder's Risk) policy is limited to a maximum amount of \$ 10,000.00 per claim. Provide a separate Builder's Risk
20 Property Insurance policy to insure that payment, or provide a notarized statement indicating Contractor's self-
22 insurance for up to that amount."

22 ***DELETE from Paragraph 11.4 - Property Insurance, Subparagraph 11.4.3 and 11.4.5 in their entirety.***

24 ***ADD the following to Subparagraph 11.4.7 – Waivers of Subrogation:***

26 "Waivers of subrogation will also apply to claims covered by the Contractor's Comprehensive General Liability
28 (CGL) insurance and the Contractor hereby agrees to include this provision in agreements with the Contractor's
Subcontractors and material suppliers, as applicable. The Contractor will be responsible for all costs associated with
obtaining such endorsements."

30 ***REVISE Subparagraph 11.4.9 by DELETING part of line 5 and 6 of the third sentence after the words***
32 ***"in interest may reach" through the words "Paragraph 4.6".***

34 ***DELETE Subparagraph 11.4.10 in its entirety, and ADD the following:***

36 "11.4.10 The Owner as fiduciary shall have power to adjust and settle a loss with insurers."

38 **ARTICLE 12 – UNCOVERING AND CORRECTION OF WORK**

40 ***ADD the following to Paragraph 12.2.1:***

42 "12.2.1.2 Work that fails to pass inspection or approval from authorities having jurisdiction will be automatically
44 considered as being "rejected" with or without any action by the Architect. Such failure will constitute a default in
46 performance, and the Contractor will expeditiously correct such Work in a manner acceptable both to the authorities
having jurisdiction and to the Owner."

48 ***MODIFY Subparagraph 12.2.2.1 by DELETING the second to the last sentence that begins: "During***
the one-year period . . ." and ***ADD the following:***

50 "The "reasonable time" allowed for Correction of Work by the Contractor will be no more than thirty (30) days after
52 receipt of notice."

54 ***ADD the following to Paragraph 12.2 – Correction of Work:***

56 "12.2.6 As a part of the Work of this Contract, the Contractor will perform an inspection with the Owner between
58 ten (10) to eleven (11) months after Substantial Completion of the Work. The purpose of this inspection is to
60 ascertain any defects or failures of the Work that may be covered by the Contractor's, Subcontractors' or any
manufacturer's warranties. If such defects, deficiencies or failures are discovered, the Contractor shall promptly
remedy such defect and will assist the Owner in notifying the appropriate Subcontractor or manufacturer, if any, of
the nature of the problem and the applicable warranty requirements.

62 12.2.7 If the Work covered by this Contract has staggered Substantial Completion dates, then the provisions of
64 paragraph 12.2 shall apply separately to each separate portion or area of the Work."

66 **ARTICLE 13 - MISCELLANEOUS PROVISIONS:**

68 ***ADD to Paragraph 13.4, the following:***

2 "13.4.3 The services to be performed by the Architect pursuant to the service agreement with the Owner are
3 intended solely for the benefit of the Owner, and no benefit is conferred thereby upon any person or entity not a
4 party to that agreement. No other person or entity shall be entitled to rely on the Architect's performance of his
5 services thereunder, and no right to assert claim against him shall accrue to the Contractor or to any subcontractor,
6 consultant, Engineer, supplier, fabricator, manufacturer, lender, tenant, insurer, surety, or any other third party as a
7 result of that agreement or the performance or non-performance of his services thereunder."

8 **ARTICLE 14 - TERMINATION OR SUSPENSION OF THE CONTRACT:**

10 *ADD the following to Subparagraph 14.2.1:*

12 "14.2.1.5 If the Contractor's Experience Modification Rating (EMR) increases above a rating of 1.0."

14 *DELETE from Paragraph 14.2.2 the phrase: "upon certification by the Architect . . . to justify such
15 action," as the Owner may terminate the Contractor without the Architect's certification."*

16 *DELETE Subparagraph 14.4.3 in its entirety and ADD the following:*

18 "14.4.3 In the event of termination for the Owner's convenience, the Contractor shall be entitled to receive payment
19 for the Work already executed, and for costs incurred by reason of such termination including reasonable overhead
20 and profit related thereto. In no event will payment be provided to cover costs for overhead or potential lost profits
21 related to the Work that is not executed."
22

24 **END OF SUPPLEMENTARY CONDITIONS**

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and other Division-1 Sections of the Specifications, apply to this Section.

6 PROJECT / WORK IDENTIFICATION:

8 SUMMARY BY REFERENCES: The Work of this Contract can be summarized by references to the Contract,
10 General Conditions, Supplementary Conditions, Specification Sections, Drawings, Addenda, and other
12 modifications to the Contract Documents issued subsequent to the initial printing of this Project Manual and
14 including but not necessarily limited to printed material referenced by any of these. It is recognized that the Work of
the Contract is also unavoidably affected or influenced by governing regulations, natural phenomenon including
weather conditions and other forces in addition to these Contract Documents.

16 ABBREVIATED SUMMARY OF THE WORK: Briefly and without force and effect upon the Contract
18 Documents, the Work of the Contract can be summarized to include the following:

20 **SITE UTILITIES AND SITE IMPROVEMENTS, to include pavement, curbs and miscellaneous sitework
appurtenances, as indicated on the Drawings;**

22 **Or**

24 **BUILDING CONNECTIONS TO EXISTING SITE UTILITIES including but not limited to gas, water,
electrical, telephone and cable utility service lines (verify actual underground connection points in field).**

26 **SITE IMPROVEMENTS, including but not limited to pavement, curbs and miscellaneous sitework
28 appurtenances, as indicated on the Drawings;**

30 **LANDSCAPE AND LANDSCAPE IRRIGATION SYSTEM WORK to include installation of landscaping
32 and irrigation system throughout the project site;**

34 **GENERAL BUILDING CONSTRUCTION of multiple retail shopping center buildings, complete with
associated mechanical, plumbing, fire-protection/alarm and electrical systems as indicated in the Contract
Documents.**

36 **WARM-DARK-SHELL: The Work includes storefront enclosure with operational rooftop HVAC
38 equipment, typically without interior ceilings, lighting, ductwork distribution, or finishes.**

40 **LIMITED INTERIOR FINISH: The Work includes interior finishing of a limited area of
42 "common-area" facilities as indicated on the Drawings.**

44 **OVER-EXCAVATION AND ENGINEERED-FILL under building floor-slabs to comply with
46 recommendations of the Owner's Geotechnical Report (included in Base Bid amount). Additional
over-excavation and engineered-fill under slabs and under building footings, if required, will be
performed on the basis of Unit Prices.**

48 **CODES & ORDINANCES:** All Work for this project shall conform to all applicable codes, and ordinances and with
applicable requirements of the National Fire Protection Association's "Life Safety Code".

50 **COSTS FOR ALL PERMITS,** utility hook-up charges, and expenses shall be included in the Work of the Contract.

52 **CONTRACT TYPE:** The Work will be constructed under a single (prime) general construction contract.

54 **USE OF PREMISES:** Contractor shall have full and unrestricted use of project site for construction operations
56 during construction period. Contractor's use of premises is limited only by Owner's right to perform work or to
58 retain other contractors on other portions of construction at the Project. Parking of workmen's automobiles will be
confined to defined areas.

60 **SEPARATE CONTRACTS:**

62 **THE OWNER WILL AWARD Separate Contracts (or a single separate Contract, or in combination with this
64 Contract) for the following Scopes of Construction Work, which include but are not limited to the following:**

66 **ROUGH GRADING: includes site clearing, rough grading, excavation, filling and compaction, removal
68 from site of un-used earthwork materials, and temporary storage of topsoil.**

HARDSCAPES: to include concrete pavement and curbs, asphalt pavement, sidewalks and miscellaneous site appurtenances.

SITE DEVELOPMENT: including fine grading, lawns and landscaping, and irrigation systems

FUTURE WORK BY SEPARATE CONTRACTS

THE OWNER RESERVES THE RIGHT TO AWARD separate contracts for performance of certain construction operations at Project site, including but not necessarily limited to:

TENANT FINISHES: finishing of individual tenant spaces after substantial completion by this Contractor. Those construction operations may be conducted simultaneously with Work under this Contract.

COOPERATE FULLY WITH SEPARATE CONTRACTORS so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract.

COORDINATION AND IMPLEMENTATION OF THE STORMWATER MANAGEMENT PLAN (SMP):

THE OWNER WILL PROVIDE a Stormwater Management Plan and will arrange and pay for the Stormwater Management Permit.

PROVIDE ASSISTANCE to the Owner for preparation and submittal of that plan.

EXECUTE AND MAINTAIN all requirements of the approved Stormwater Management Plan throughout the Work at the site. Maintain required erosion-control devices in full operating condition, without failure. Maintain all documents including but not limited to forms and photographs required by the plan and authorities having jurisdiction. Repair damage to erosion control devices installed by other separate contractors at the site resulting from the Work of this contract. Other separate contractors will be responsible to repair erosion control devices damaged by their activities.

CAREFULLY STUDY AND COMPARE ALL DRAWINGS (including but not limited to Architectural, Structural, Mechanical or Electrical) and other Contract Documents with the existing conditions at the project-site. Report errors, inconsistencies or omissions discovered for clarification. The Contractor will be responsible for repair or correction costs if work is executed with knowledge that it involves an error, inconsistency, or omission - without the above notice.

THE INTENT OF THE CONSTRUCTION DOCUMENTS is to include all items necessary for the proper execution and completion of the Work – and to provide all products, materials, equipment, or accessories required for proper operation, in accordance with their manufacturer’s requirements. The Contract Documents are complementary – what is required by one shall be as binding as if required by all. While prepared with due care and diligence, perfection is not possible. Design and construction are complex - every possible condition or contingency cannot be anticipated or fully indicated. Any work or material which is not directly or indirectly noted in the Contract Documents but is necessary for the proper carrying out of the work, is to be understood as “implied” and is to be provided by the contractor in his proposal as fully as if specified, described, or delineated.

SPECIFICATION FORMATS AND CONVENTIONS

THE SPECIFICATIONS ARE ORGANIZED into Divisions and Sections based in general on the 50-division format and CSI's "2004 MasterFormat" numbering system.

SECTION IDENTIFICATION: The Specifications use Section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence; however, the sequence is incomplete. Consult the Table of Contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.

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:

ABBREVIATED LANGUAGE: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

IMPERATIVE MOOD AND STREAMLINED LANGUAGE are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.

SUMMARY OF WORK

SECTION 01 11 00

Box – New Longview, Lot 44

Klover Project No. 23150.001

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.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 01 11 00

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.
- B. Related Requirements:
 - 1. Section 016000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

- A. 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.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A or similar form approved by the Architect.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination 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 substitution 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, sustainable design characteristics, 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 and 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 substitution 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.
3. 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.

1.5 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.

1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 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. Requested substitution provides sustainable design characteristics that specified product provided.
 - c. Substitution request is fully documented and properly submitted.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.
 - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.

- i. 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: Architect will consider requests for substitution if received within 60 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.
 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 offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Requested substitution provides sustainable design characteristics that specified product provided.
 - e. Substitution request is fully documented and properly submitted.
 - f. Requested substitution will not adversely affect Contractor's construction schedule.
 - g. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - h. Requested substitution is compatible with other portions of the Work.
 - i. Requested substitution has been coordinated with other portions of the Work.
 - j. Requested substitution provides specified warranty.
 - k. 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.

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and other Division-1 Sections of the Specifications, apply to this Section.

6 THIS SECTION SPECIFIES administrative and procedural requirements for handling and processing Contract
8 modifications.

10 RELATED SECTIONS INCLUDE the following:

12 **"UNIT PRICES" for administrative requirements for using unit prices are in other Division-1 Sections.**

14 "PRODUCT REQUIREMENTS" for administrative procedures for handling requests for substitutions
made after Contract award, are in other Division-1 Sections.

16 SUPPLEMENTAL INSTRUCTIONS will be issued by the Architect authorizing minor changes in the Work, not
18 involving adjustment to the Contract Sum or the Contract Time.

20 **REQUEST FOR INTERPRETATION (RFI)**

22 **SUBMIT REQUEST FOR INTERPRETATION** to Architect after review of Contract Documents and field
24 conditions immediately on discovery of the need for clarification. Include a detailed description of problem
encountered, together with recommendations for changing the Contract Documents. Submit requests on the form
26 included herein, or alternative form as approved by the Architect.

28 **SUBMIT RFI'S ONLY AFTER** a thorough review of all applicable Contract Documents, and **ONLY** if the
Contractor is still not able to resolve the problem or clarification based on the information contained therein.
Unnecessary RFI's adversely affect the Architect's ability to respond in a timely manner to valid RFI's

30 **IF UNNECESSARY RFI'S ARE CONSISTENTLY SUBMITTED**, as the information being requested is adequately
32 indicated within the Construction Documents in the professional opinion of the Architect, then the Architect **MAY**
recommend that the Owner pay for Architect's additional time required to respond to the unnecessary RFI's and
34 deduct that amount from the Contract Sum.

36 **THE ARCHITECT WILL RESPOND ONLY TO RFI'S** prepared by the Contractor's Project Manager or Project
38 Superintendent. Subcontractor. RFI's from sub-contractors or material suppliers must be forwarded to, reviewed by,
and submitted only by the Contractor. Unless otherwise directed by the Architect, **DO NOT** contact the Architect's
40 sub-consultants directly – all RFI's to sub-consultants **MUST** be forwarded from the Architect.

42 **RESPONSE TO RFI'S IS NOT AN AUTHORIZATION** to proceed with additional or extra work.

44 **PROPOSAL REQUESTS**

46 **OWNER-INITIATED PROPOSAL REQUESTS:** The Architect will issue a detailed description of proposed
48 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.

50 **PROPOSAL REQUESTS ISSUED BY ARCHITECT ARE FOR INFORMATION ONLY.** Do not
consider them instructions either to stop work in progress or to execute the proposed change.

52 **SUBMIT A QUOTATION** estimating cost adjustments to the Contract Sum and the Contract Time
necessary to execute the change, within the time specified in Proposal Request after receipt.

54 **INCLUDE A LIST OF QUANTITIES** of products required or eliminated and unit costs, with total amount
of purchases and credits to be made.

56 **IF REQUESTED, FURNISH SURVEY DATA** to substantiate quantities. Indicate applicable taxes,
delivery charges, equipment rental, and amounts of trade discounts.

58 **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.

60 **CONTRACTOR-INITIATED PROPOSALS:** If latent or unforeseen conditions require modifications to the
62 Contract, Contractor may propose changes by submitting a request for a change.

64 **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.

66 **INCLUDE A LIST OF QUANTITIES OF PRODUCTS** required or eliminated and unit costs, with total
68 amount of purchases and credits to be made. If requested, furnish survey data to substantiate
quantities.

INDICATE APPLICABLE TAXES, delivery charges, equipment rental, and amounts of trade discounts.
 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.
 COMPLY WITH DIVISION-1 SECTION "PRODUCT REQUIREMENTS" if the proposed change requires substitution of one product or system for product or system specified.
 PROPOSAL REQUEST FORM: Use AIA Document G709 for Proposal Requests, or other form approved in advance by the Architect.

ALLOWANCES

TO ADJUST ALLOWANCE AMOUNTS, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.

INCLUDE INSTALLATION COSTS in purchase amount only where indicated as part of the allowance.
 PREPARE EXPLANATION AND DOCUMENTATION to substantiate distribution of overhead costs and other margins claimed, if requested.

SUBMIT SUBSTANTIATION OF A CHANGE IN SCOPE OF WORK, if any, claimed in Change Orders related to unit-cost allowances.

THE OWNER RESERVES THE RIGHT to establish the quantity of work-in-place by independent quantity survey, measure, or count.

SUBMIT CLAIMS FOR INCREASED COSTS because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 21 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 21 days after such authorization.

DO NOT INCLUDE CONTRACTOR'S OR SUBCONTRACTOR'S INDIRECT EXPENSE in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.

NO CHANGE TO CONTRACTOR'S INDIRECT EXPENSE IS PERMITTED for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

CHANGE ORDER PROCEDURES

ISSUE CHANGE ORDERS on a monthly basis (if necessary) for signatures of the Architect and Owner on AIA Document G701 or equivalent form. Only those Proposal Requests or Requests for Proposals that have been previously approved by the Owner may be included.

WORK DIRECTIVES

The Owner may issue Work Directives for the addition of limited construction work to the scope of this Contract. Work Directives will usually be issued to add tenant finish completion to various tenant spaces, per requirements of leasing documents, and may incorporate specified Unit Costs. Retainage will not be applied to Work Directives.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

ATTACHMENTS TO SECTION:

CSI Form 13.2A, "Request for Interpretation"

END OF SECTION 01 26 00

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and other Division-1 Sections of the Specifications, apply to this Section.

6 THIS SECTION INCLUDES administrative and procedural requirements necessary to prepare and process
8 Applications for Payment.

10 RELATED SECTIONS include the following:

12 "CONTRACT MODIFICATION REQUIREMENTS" for administrative procedures for handling changes
14 to the Contract are specified in other Division-1 Sections

16 "CONSTRUCTION PROGRESS DOCUMENTATION" for administrative requirements governing
18 preparation and submittal of Contractor's Construction Schedule and Submittals Schedule are specified in
other Division-1 Sections

20 DEFINITIONS

22 SCHEDULE OF VALUES: A statement furnished by the Contractor allocating portions of the Contract Sum to
24 various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

26 SCHEDULE OF VALUES

28 COORDINATE PREPARATION of the Schedule of Values with preparation of Contractor's Construction
30 Schedule. Correlate line items in the Schedule of Values with other required administrative forms and schedules,
including the Application for Payment forms with Continuation Sheets, and the Submittals Schedule.

32 SUBMIT THREE (3) copies to Architect not less than fifteen (15) days before the date scheduled for submittal of
34 initial Applications for Payment. Where the Work is separated into phases requiring separately phased payments,
provide sub-schedules showing values correlated with each phase of payment.

36 FORMAT AND CONTENT: Submit printed schedule on AIA Document G703 "Continuation Sheets", or
38 equivalent Owner and Architect approved form. Use the Project Manual's "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. Include the
following Project identification on the Schedule of Values:

- 40 Project name and location.
- 42 Name of Architect, and Architect's project number
- Contractor's name and address, and
- 44 Date of submittal.

ARRANGE THE SCHEDULE OF VALUES in tabular form with separate columns to indicate the following for
each item listed:

- 46 Related Specification Section or Division.
- 48 Description of the Work.
- Name of subcontractor.
- 50 Name of manufacturer or fabricator.
- Name of supplier.
- 52 Change Orders (numbers) that affect value.
- Dollar value.
- 54 Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

56 PROVIDE A BREAKDOWN OF THE CONTRACT SUM in enough detail to facilitate continued evaluation of
58 Applications for Payment and progress reports. Provide several line items for principal subcontract amounts, where
appropriate. Provide additional breakdown line-items when requested by either the Owner or Architect. Provide
substantiation information to justify line-item amounts when requested by the Owner or Architect.

60 ROUND AMOUNTS to nearest whole dollar; total shall equal the Contract Sum.

62 PROVIDE SEPARATE LINE ITEMS for each part of the Work where Applications for Payment may include
64 materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored
on-site and items stored off-site (provide evidence of insurance or bonded warehousing for items stored off-site).
66 Provide separate line items for initial cost of materials, for each subsequent stage of completion, and for total
installed value of that part of the Work.

68

2 EACH ALLOWANCE shall have a separate line item. 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.

4 INDICATE CONTRACTOR'S OVERHEAD AND PROFIT as a separate line item amount. Temporary facilities
6 and other major cost items that are not direct cost of actual work-in-place shall be indicated as separate line items.

8 UPDATE AND RESUBMIT the Schedule of Values before the next Applications for Payment when Change Orders
or Construction Change Directives result in a change in the Contract Sum.

12 **APPLICATIONS FOR PAYMENT:**

14 **CONSISTENCY:** Each Application for Payment shall be consistent with previous applications and payments as
certified by Architect and paid for by Owner. Initial Application for Payment, Application for Payment at time of
16 Substantial Completion, and final Application for Payment involve additional requirements.

18 **PAYMENT APPLICATION TIMES:** Unless otherwise indicated in the Agreement form, the required date for each
progress payment is the tenth (10th) day of each month. The period covered by each Application for Payment starts
20 on the day following the end of the preceding period and ends ten (10) days before the date for each progress
payment.

22 **FORM:** Use AIA Document G702 and AIA Document G703 Continuation Sheets or an equivalent document
24 approved in advance by the Owner and Architect.

26 **APPLICATION PREPARATION:** Complete every entry on the form. Notarize and execute by a person authorized
to sign legal documents on behalf of Contractor. The Architect will return incomplete applications without action.
28 Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules
if revisions were made. Include amounts of Change Orders and Construction Change Directives as indicated in the
30 "Contractor Payout Flowchart."

32 **SUBMIT THREE (3) signed and notarized originals of each Application for Payment to Architect by a method**
ensuring receipt within 24 hours. All copies shall include waivers of lien and similar attachments. Transmit each
34 copy with a transmittal form listing attachments and recording appropriate information about application.

36 **REQUIRED ATTACHMENTS:** Provide an updated Schedule Of Values and Construction Progress Schedule with
each Application for Payment, in addition to required Lien Waivers.

38 **ARCHITECT'S ACTION:** Upon receipt of the Application for Payment, the Architect will review and note any
40 discrepancies prior forwarding to the Owner.

42 **PROVIDE SUBSTANTIATING INFORMATION** upon request of either the Owner or the Architect, justifying line
item payment amounts in dispute. Substantiating information may include, but is not limited to itemized
44 subcontractor payment requests, material or equipment receipts, partial lien waivers, and similar documents.

46 **PARTIAL LIEN WAIVERS:** At any time throughout the project, the Owner reserves the right to require submittal
of partial lien waivers indicating that lien rights are "unconditionally released" for all amounts previously paid, and
48 "conditionally released" or contingent only upon receipt and bank clearance of the current payment-application
amounts then due. Unless otherwise required by the Owner, provide partial waivers from the Contractor, and for all
50 subcontractors, sub-subcontractors, suppliers and any other entities lawfully entitled to file a lien in excess of One
Thousand Dollars (\$1,000.00) arising out of the Work of the Construction Contract. The Owner reserves the right to
52 designate which entities involved in the Work must submit waivers. Submit all waivers on the 1990 Edition of the
"Waiver and Release of Lien" form as issued by the Construction Industry Affairs Council of Greater Kansas City
54 Inc (CIAC) or other form provided or approved by the Owner, fully executed in a manner acceptable to Owner.

56 **INITIAL APPLICATION FOR PAYMENT:** Administrative actions and submittals that must precede or coincide
with submittal of first Application for Payment include the following:

58 List of subcontractors.

Schedule of Values.

60 Contractor's Construction Schedule (preliminary if not final).

Products list.

62 Schedule of unit prices.

Submittals Schedule (preliminary if not final).

64 List of Contractor's staff assignments, and principal consultants.

66 Copies of all applicable building permits (except for those obtained directly by the Owner)

Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.

68 Initial progress report.

Report of preconstruction conference.

70 Certificates of Insurance (AIA G705) and evidence satisfactory to the Owner that Contractor's insurance
coverages have been secured.

Performance and payment bonds (if required).
Data needed to acquire Owner's insurance.

APPLICATION FOR PAYMENT AT SUBSTANTIAL COMPLETION: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

FINAL PAYMENT APPLICATION: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

- Evidence of completion of Project closeout requirements.
- Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
- Updated final statement, accounting for final changes to the Contract Sum.
- AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
- AIA Document G706A, "Contractor's Affidavit of Release of Liens."
- AIA Document G707, "Consent of Surety to Final Payment."
- Evidence that claims have been settled.
- 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.
- Final, liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

ATTACHMENTS INCLUDED HEREIN:

"Waiver and Release of Lien" Form

END OF SECTION 01 29 00

WAIVER & RELEASE OF LIEN

PROJECT: (Name and address):

OWNER: (Name and address):

Contract or Reference No:

WHEREAS THE UNDERSIGNED: Contractor, Subcontractor, Supplier, Architect or Engineer, or _____
has provided labor, services, materials or equipment, for the above project, under an agreement with:

_____ In its capacity as: Owner or Owner's agent, Contractor, Subcontractor, Architect or Engineer.

SECTION A (check box and initial only one of the following):

(Initial) _____ **PARTIAL WAIVER AND RELEASE: IN CONSIDERATION OF PARTIAL PAYMENT** for labor, services, materials or equipment provided in the amount of: _____ Dollars (\$ _____) covering the following Partial Payment Request(s) or Invoice(s): (attach additional pages if necessary)

DATE: _____ **PAYMENT REQUEST or INVOICE NUMBER:** _____ **AMOUNT:** _____

Together with any previous payment(s) already received, but excluding any retainage or any labor, services, materials or equipment provided after the date of: _____, 20 ____ .

(Initial) _____ **FINAL WAIVER AND RELEASE: IN CONSIDERATION OF FINAL PAYMENT** for all labor, services, materials or equipment provided in the amount of: _____ Dollars (\$ _____)

THE UNDERSIGNED DOES HEREBY WAIVE AND RELEASE all bond claims, liens, or claims or right of lien, statutory or otherwise, against the property, project, Owner and any sureties, for labor, services, materials or equipment, as provided by the Undersigned, but only to the extent of payment received, as indicated above and as limited below:

SECTION B: (check and initial only one of the following)

(Initial) _____ **CONDITIONAL RELEASE: THIS WAIVER AND RELEASE IS CONTINGENT UPON RECEIPT OF PAYMENT** and final bank clearance of said remittance in the above amount. The remittance identified as payment and endorsed by the Undersigned marked "paid" or otherwise cancelled by the bank against which said remittance was drawn, shall constitute conclusive proof that said invoice or pay request was paid and that payment therefore was received by the Undersigned, and thereupon, this waiver and release shall become effective automatically without the requirement of any further act, acknowledgment or receipt on the part of the Undersigned.

ADDITIONALLY, THE UNDERSIGNED ACKNOWLEDGES RECEIPT of the total amount of \$ _____ in previous payment and does hereby grant unconditional release of all above described claims for that amount.

(Initial) _____ **UNCONDITIONAL RELEASE: THE UNDERSIGNED ACKNOWLEDGES RECEIPT OF PAYMENT** in the above amount for labor, services, materials or equipment as described herein, and does hereby grant this release unconditionally.

THE PERSON SIGNING below does hereby certify that he or she is fully authorized and empowered to execute this instrument and to bind the Undersigned hereto, and does in fact so execute this instrument.

COMPANY NAME:

ADDRESS:

SIGNED: _____

TITLE:

State of: _____)
_____) SS

County of: _____)

Subscribed and sworn to before me this

_____ day of _____, 20 ____

NOTARY PUBLIC:

SIGNED: _____

My Commission Expires:

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and other Division-1 Sections of the Specifications, apply to this Section.

6 THIS SECTION INCLUDES administrative provisions for coordinating construction operations on Project
including, but not limited to, the following:

- 8 General project coordination procedures.
- Conservation.
- 10 Coordination Drawings.
- Administrative and supervisory personnel.
- 12 Project meetings.

14 RELATED SECTIONS: The following Sections contain requirements that relate to this Section:
"CONSTRUCTION PROGRESS DOCUMENTATION" for preparing and submitting the Contractor's
16 Construction Schedule, is specified in other Division-1 Sections.
"CLOSEOUT PROCEDURES" for coordinating Contract closeout.

18 **COORDINATION**

20 COORDINATE CONSTRUCTION OPERATIONS included in various Sections of the Specifications to ensure
22 efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different
Sections, that depend on each other for proper installation, connection, and operation.

24 SCHEDULE CONSTRUCTION OPERATIONS in sequence required to obtain the best results where
26 installation of one part of the Work depends on installation of other components, before or after its own
installation.

28 COORDINATE INSTALLATION of different components with other contractors to ensure maximum
30 accessibility for required maintenance, service, and repair. Make adequate provisions to accommodate
items scheduled for later installation.

32 PREPARE MEMORANDA for distribution to each party involved, outlining special procedures required for
34 coordination, if necessary. Include such items as required notices, reports, and list of attendees at meetings. Prepare
similar memoranda for Owner and separate contractors if coordination of their Work is required.

36 ADMINISTRATIVE PROCEDURES: Coordinate scheduling and timing of required administrative procedures with
38 other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of
the Work. Such administrative activities include, but are not limited to, the following:

- 40 Preparation of Contractor's Construction Schedule.
- Preparation of the Schedule of Values.
- 42 Installation and removal of temporary facilities and controls.
- Delivery and processing of submittals.
- 44 Progress meetings.
- Pre-installation conferences.
- 46 Project closeout activities.

48 CONSERVATION: Coordinate construction activities to ensure that operations are carried out with consideration
50 given to conservation of energy, water, and materials. Salvage materials and equipment involved in performance of,
but not actually incorporated into, the Work.

52 **SUBMITTALS**

54 PREPARE COORDINATION DRAWINGS if limited space availability necessitates maximum utilization of space
56 for efficient installation of different components or if coordination is required for installation of products and
materials fabricated by separate entities.

- 58 Indicate relationship of components shown on separate Shop Drawings.
- Indicate required installation sequences.
- 60 Refer to applicable Division-15 and Division-16 Sections for specific coordination Drawing requirements
for mechanical and electrical installations.

62 STAFF NAMES: Within 15 days of starting construction operations, submit a list of principal staff assignments,
64 including superintendent, personnel at Project site, and administrative and supervisory personnel at main office.
Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and
66 office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in
the absence of individuals assigned to Project. Post copies of list in Project meeting room, in temporary field office,
68 and by each temporary telephone.

ADMINISTRATIVE AND SUPERVISORY PERSONNEL

IN ADDITION to the Project superintendent, provide administrative and supervisory personnel as required for proper performance of the Work. Include special personnel required for coordination of operations with other contractors.

PROJECT MEETINGS

SCHEDULE AND CONDUCT MEETINGS AND CONFERENCES at Project site, unless otherwise indicated.

ATTENDEES: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times at least 10 days prior to meetings.

PREPARE THE MEETING AGENDA, and distribute to all invited attendees.

MINUTES: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within 3 days of the meeting.

PRECONSTRUCTION CONFERENCE:

SCHEDULE A PRECONSTRUCTION CONFERENCE before starting construction, at a time convenient to Owner, and Architect, but no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.

ATTENDEES: Authorized representatives of Owner, Architect; Contractor and its superintendent; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

AGENDA: Discuss items of significance that could affect progress, including the following:

- Tentative construction schedule.
- Phasing.
- Critical work sequencing.
- Designation of responsible personnel.
- Procedures for processing field decisions and Change Orders.
- Procedures for processing Applications for Payment.
- Distribution of the Contract Documents.
- Submittal procedures.
- Preparation of Record Documents.
- Use of the premises.
- Responsibility for temporary facilities and controls.
- Parking availability.
- Office, work, and storage areas.
- Equipment deliveries and priorities.
- First aid.
- Security.
- Progress cleaning.
- Working hours.

PREINSTALLATION CONFERENCES:

CONDUCT A PREINSTALLATION CONFERENCE at Project site before each construction activity that requires coordination with other construction.

ATTENDEES: 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. Advise Architect and Owner of scheduled meeting dates.

AGENDA: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

- Contract Documents.
- Options.
- Related Change Orders.
- Purchases.
- Deliveries.
- Submittals.
- Review of mockups.

- 2 Possible conflicts.
- 3 Compatibility problems.
- 4 Time schedules.
- 5 Weather limitations.
- 6 Manufacturer's written recommendations.
- 7 Warranty requirements.
- 8 Compatibility of materials.
- 9 Acceptability of substrates.
- 10 Temporary facilities and controls.
- 11 Space and access limitations.
- 12 Regulations of authorities having jurisdiction.
- 13 Testing and inspecting requirements.
- 14 Required performance results.
- 15 Protection of construction and personnel.

16 RECORD SIGNIFICANT CONFERENCE DISCUSSIONS, agreements, and disagreements.

18 DO NOT PROCEED WITH INSTALLATION if the conference cannot be successfully concluded. Initiate whatever
20 actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest
21 feasible date.

22 **PROGRESS MEETINGS**

24 CONDUCT PROGRESS MEETINGS at regular intervals. Coordinate dates of meetings with preparation of
26 payment requests.

28 ATTENDEES: In addition to representatives of Owner, and Architect, each contractor, subcontractor, supplier, and
30 other entity concerned with current progress or involved in planning, coordination, or performance of future
31 activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and
32 authorized to conclude matters relating to the Work.

34 **PROGRESS MEETING AGENDA:**

- 34 Review and correct or approve minutes of previous progress meeting.
- 35 Review of work progress since previous meeting
- 36 Review the updating of the Record Documents of Work completed
- 37 Status of Contractor's Construction Schedule: Determine whether each activity is on time, ahead of
38 schedule, or behind schedule. Discuss whether schedule revisions are required to ensure that
39 current and subsequent activities will be completed within the Contract Time.
- 40 Review of pending work scheduled to be performed: If necessary, determine how construction behind
41 schedule will be expedited; secure commitments from parties involved to do so.
- 42 Review construction quality, work standards and progress cleaning
- 43 Review any known problems and conflicts
- 44 Review status of Contractor's submittals
- 45 Review pending changes or Contract modifications, and documentation of supporting information
- 46 Proposed items for discussion at next meeting

48 REPORTING: Distribute minutes of the meeting to each party present and to parties who should have been present.
50 Include a brief summary, in narrative form, of progress since the previous meeting and report.

52 REVISE CONTRACTOR'S CONSTRUCTION SCHEDULE after each progress meeting where revisions to the
53 schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

54 **PART 2 - PRODUCTS** (Not Used)

58 **PART 3 - EXECUTION** (Not Used)

60 **END OF SECTION 01 31 00**

62



▶ **project meeting notes**

date: XX MONTH XXXX	project: PROJECT NAME
date/time of meeting: XX MONTH XXXX – 1:00 to 2:30 PM	Project Location / center Project City, State, Zip
attn: Owner Contact Name, Title	project no. XXXXX.XXX
to: OWNER COMPANY NAME Address City, State, Zip	copy(s) to: all participants (noted below) and to: Consultant Company Consultant Company # 2
email: name@email.com	via: email ONLY

location of meeting:
at the Project Site: Contractor's project trailer

key participants in attendance (in addition to the Architect representative):
Firstname, Lastname, Developer's representative
Firstname Lastname, Superintendent, Contractor Company Name
Engineer Name, Engineer Company

- item #:** Discussion topics:
- 1.
 - 2.
 - 3.
 - 4.
- review and correct or approve meeting notes of previous progress meeting:**
- 5.
 - 6.
- review work progress since previous meeting:**
- 7.
 - 8.
 - 9.
- review updating of Record Documents of Work completed**
- 10.
 - 11.
 - 12.
- review status of contractors' Submittal Schedule:**
- 13.
 - 14.
 - 15.
- review status of Contractor's Construction Schedule:**
- 16.
 - 17.
 - 18.
- review pending Work scheduled:**
- 19.
 - 20.

Item #: Discussion topics:

21. _____

22. _____

23. _____

review construction quality, work standards and progress cleaning:

24. _____

25. _____

26. _____

27. _____

review of known problems or conflicts and proposed actions:

28. _____

29. _____

30. _____

review of pending changes or modifications anticipated:

31. _____

32. _____

33. _____

proposed items for discussion at next meeting:

34. _____

35. _____

36. _____

37. _____

These notes summarize my understanding of the discussions, agreements and conclusions reached. If you believe that anything is incorrect, or if you have any comments or question regarding these notes, please contact me as soon as possible.

issued by the Architect:

Klover Architects, Inc.

by:

Architect Project Manager, Title

attachments:

The following are included as a part of the meeting notes to clarify the items discussed:

- Photos of XX/XX/XX – 12 total

- Copy of Drawing A200 – for information

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and other Division-1 Sections of the Specifications, apply to the Work of this Section.

6 THIS SECTION INCLUDES administrative and procedural requirements for documenting the progress of
construction during performance of the Work, including the following:

- 8 Preliminary Construction Schedule.
- Contractor's Construction Schedule.
- 10 Submittals Schedule.
- Daily construction reports.
- 12 Material location reports.
- Field condition reports.
- 14 Special reports.

DEFINITIONS

18 **ACTIVITY:** A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling
the construction project. Activities included in a construction schedule consume time and resources. "Critical"
20 activities are activities on the critical path. They must start and finish on the planned early start and finish times.
22 "Predecessor" activity is an activity that must be completed before a given activity can be started.

24 **CRITICAL PATH:** The longest continuous chain of activities through the network schedule that establishes the
minimum overall Project duration and contains no float.

26 **FLOAT:** The measure of leeway in starting and completing an activity. Float time is not for the exclusive use or
benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as
28 needed to meet schedule milestones and Contract completion date. "Free float" is the amount of time an activity can
be delayed without adversely affecting the early start of the following activity. "Total float" is the measure of leeway
30 in starting or completing an activity without adversely affecting the planned Project completion date.

32 **MILESTONE:** A key or critical point in time for reference or measurement.

34 **NETWORK DIAGRAM:** A graphic diagram of a network schedule, showing activities and activity relationships.

SUBMITTALS

40 **QUALIFICATION DATA:** For firms and persons specified in "Quality Assurance" Article to demonstrate their
capabilities and experience. Include lists of completed projects with project names and addresses, names and
42 addresses of architects and owners, and other information specified.

44 **SUBMITTALS SCHEDULE:** SUBMIT SIX (6) COPIES of schedule. Arrange the following information in a
tabular format:

- 46 Scheduled date for first submittal.
- Specification Section number and title.
- 48 Submittal category (action or informational).
- Name of subcontractor.
- 50 Description of the Work covered.
- Scheduled date for Architect's final release or approval.

52 **PRELIMINARY CONSTRUCTION SCHEDULE:** Submit 2 printed copies; one a single sheet of reproducible
54 media, and one a print.

56 **PRELIMINARY NETWORK DIAGRAM:** Submit 2 printed copies; one a single sheet of reproducible media, and
58 prints; large enough to show entire network for entire construction period.

CONTRACTOR'S CONSTRUCTION SCHEDULE: Submit two (2) printed copies of initial schedule, one a
60 reproducible print and blue- or black-line prints, large enough to show entire schedule for entire construction period.
Submit an electronic copy of schedule, using software approved by Owner, on a CD disk, and labeled to comply
62 with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.

64 **DAILY CONSTRUCTION REPORTS:** Submit two copies at weekly intervals.

66 **MATERIAL LOCATION REPORTS:** Submit two copies at weekly intervals.

68 **FIELD CONDITION REPORTS:** Submit two copies at time of discovery of differing conditions.

2 SPECIAL REPORTS: Submit two copies at time of unusual event.

4 QUALITY ASSURANCE

6 SCHEDULER'S QUALIFICATIONS: An experienced specialist in CPM scheduling and reporting. Contractor may utilize in-house personnel if qualified and experienced.

8 PRESCHEULING CONFERENCE: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to the Preliminary Construction Schedule and Contractor's Construction Schedule, including, but not limited to, the following:

12 Review software limitations and content and format for reports.

14 Verify availability of qualified personnel needed to develop and update schedule.

16 Discuss constraints, including phasing, work stages, area separations, interim milestones and partial Owner occupancy.

18 Review delivery dates for Owner-furnished products.

20 Review schedule for work of Owner's separate contracts.

22 Review time required for review of submittals and resubmittals.

24 Review requirements for tests and inspections by independent testing and inspecting agencies.

26 Review time required for completion and startup procedures.

28 Review and finalize list of construction activities to be included in schedule.

30 Review submittal requirements and procedures.

32 Review procedures for updating schedule.

34 COORDINATION

36 COORDINATE PREPARATION AND PROCESSING of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

38 COORDINATE CONTRACTOR'S CONSTRUCTION SCHEDULE with the Schedule of Values, list of subcontracts, Submittals Schedule, progress reports, payment requests, and other required schedules and reports.

40 Secure time commitments for performing critical elements of the Work from parties involved.

42 Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

44 **PART 2 - PRODUCTS**

46 SUBMITTALS SCHEDULE

48 PREPARATION: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

50 COORDINATE SUBMITTALS SCHEDULE with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.

52 INITIAL SUBMITTAL: Submit concurrently with preliminary bar-chart schedule. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication. At Contractor's option, show submittals on the Preliminary Construction Schedule, instead of tabulating them separately.

54 FINAL SUBMITTAL: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

56 CONTRACTOR'S CONSTRUCTION SCHEDULE

58 COMPLY WITH PROCEDURES contained in AGC's "Construction Planning & Scheduling."

60 TIME FRAME: Extend schedule from date established for the Notice to Proceed to date of Final Completion. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

62 ACTIVITIES: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:

64 ACTIVITY DURATION: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.

2 PROCUREMENT ACTIVITIES: Include procurement process activities for long lead items and major
4 items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle
 activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and
 delivery.

6 SUBMITTAL REVIEW Time: Include review and resubmittal times indicated in Division 1 Section
 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's
 Construction Schedule with Submittals Schedule.

8 STARTUP AND TESTING TIME: Include not less than 5 days for startup and testing.

10 SUBSTANTIAL COMPLETION: Indicate completion in advance of date established for Substantial
 Completion, and allow time for Architect's and Construction Manager's administrative procedures
 necessary for certification of Substantial Completion.

12 CONSTRAINTS: Include constraints and work restrictions indicated in the Contract Documents and as follows in
14 schedule, and show how the sequence of the Work is affected.

16 PHASING: Arrange list of activities on schedule by phase.

18 WORK RESTRICTIONS: Show the effect of the following items on the schedule:

 Coordination with existing construction.

 Limitations of continued occupancies.

 Uninterruptible services.

 Partial occupancy before Substantial Completion.

 Use of premises restrictions.

 Provisions for future construction.

 Seasonal variations.

 Environmental control.

26 WORK STAGES: Indicate important stages of construction for each major portion of the Work, including,
 but not limited to, the following:

 Subcontract awards.

 Submittals.

 Purchases.

 Mockups.

 Fabrication.

 Sample testing.

 Deliveries.

 Installation.

 Tests and inspections.

 Adjusting.

 Curing.

 Startup and placement into final use and operation.

38 AREA SEPARATIONS: Identify each major area of construction for each major portion of the Work.
40 Indicate where each construction activity within a major area must be sequenced or integrated with other
 construction activities to provide for the following:

 Structural completion.

 Permanent space enclosure.

 Completion of mechanical installation.

 Completion of electrical installation.

 Substantial Completion.

48 INCLUDE MILESTONES indicated in the Contract Documents in schedule, including, but not limited to, the
50 Notice to Proceed, Substantial Completion, and Final Completion.

52 CONTRACT MODIFICATIONS: For each proposed contract modification and concurrent with its submission,
 prepare a time-impact analysis using fragnets to demonstrate the effect of the proposed change on the overall project
 schedule.

54 COMPUTER SOFTWARE: Prepare schedules using a program that has been developed specifically to manage
56 construction schedules and approved by Owner. If specialty, proprietary scheduling software is utilized (generally,
58 anything beyond MS Excel or MS Project), provide electronic schedule in a format useable by other entities (such as
 a PDF format) without their ownership of the scheduling software.

60 **CONTRACTOR'S CONSTRUCTION SCHEDULE**

62 SUBMIT A COMPREHENSIVE CONSTRUCTION SCHEDULE within 10 days of date established the Notice to
64 Proceed. Base schedule on the Preliminary Construction Schedule and whatever updating and feedback was received
 since the start of Project.

66 PREPARATION: Indicate each significant construction activity separately. Identify first workday of each week with
68 a continuous vertical line. For construction activities that require 3 months or longer to complete, indicate an
 estimated completion percentage in 10 percent increments within time bar.

REPORTS

2 **DAILY CONSTRUCTION REPORTS:** Prepare a daily construction report recording the following information
4 concerning events at Project site:

- 6 List of subcontractors at Project site.
- 6 List of separate contractors at Project site.
- 8 Approximate count of personnel at Project site.
- 8 High and low temperatures and general weather conditions.
- 10 Accidents.
- 10 Meetings and significant decisions.
- 12 Unusual events (refer to special reports).
- 12 Stoppages, delays, shortages, and losses.
- 14 Meter readings and similar recordings.
- 14 Emergency procedures.
- 16 Orders and requests of authorities having jurisdiction.
- 16 Change Orders received and implemented.
- 18 Construction Change Directives received.
- 18 Services connected and disconnected.
- 20 Equipment or system tests and startups.
- 20 Partial Completions and occupancies.
- 22 Substantial Completions authorized.

22 **MATERIAL LOCATION REPORTS:** At regular intervals, prepare a comprehensive list of materials delivered to
24 and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently
26 delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment
fabricated or stored away from Project site.

28 **FIELD CONDITION REPORTS:** Immediately on discovery of a difference between field conditions and the
30 Contract Documents, prepare a detailed report. Submit with a request for information. Include a detailed description
of the differing conditions, together with recommendations for changing the Contract Documents.

32 **SUBMIT SPECIAL REPORTS** directly to Owner within one day of an occurrence. Distribute copies of report to
34 parties affected by the occurrence. When an event of an unusual and significant nature occurs at Project site,
whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons
36 participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information.
Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION**CONTRACTOR'S CONSTRUCTION SCHEDULE**

40 **CONTRACTOR'S CONSTRUCTION SCHEDULE UPDATING:** At minimum of monthly intervals, update
42 schedule to reflect actual construction progress and activities. If un-anticipated delays are discovered or occur, revise
44 schedule immediately upon discovery. Issue schedule one week before each regularly scheduled progress meeting.

46 **REVISE SCHEDULE** immediately after each meeting or other activity where revisions have been
recognized or made. Issue updated schedule concurrently with the report of each such meeting.

48 **INCLUDE A REPORT WITH UPDATED SCHEDULE** that indicates every change, including, but not
limited to, changes in logic, durations, actual starts and finishes, and activity durations.

50 **INDICATE ACTUAL COMPLETION PERCENTAGE** for each activity, As the Work progresses.

52 **DISTRIBUTE COPIES** of approved schedule to Architect, Owner, separate contractors, testing and inspecting
agencies, and other parties identified by Contractor with a need-to-know schedule responsibility. Post copies in
54 Project meeting rooms and temporary field offices. When revisions are made, distribute updated schedules to the
same parties and post in the same locations. Delete parties from distribution when they have completed their
56 assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 32 00

INITIAL SUBMITTAL INFORMATION					
SUBMITTAL #	SPEC SECTION	SUBMITTAL TITLE	FROM WHOM	Date Rcvd	# Rcvd
	1C	Schedule of Values			
	01 33 00	Submittal Schedule			
		Preliminary Construction Schedule			
		Construction Schedule (final)			
		Construction Photographs (digital - on-going)			
		Daily Construction Reports (electronic - on-going)			
	01 45 00	Sub-contracted Engineer INSURANCE CERTIFICATES			
	01 50 00	Temporary Utility REPORTS			
	01 60 00	Product LIST			
		Substitution REQUESTS			
	01 77 00	Punch LIST			
		Warranty SUBMITTAL			
		Occupancy PERMIT and other legal releases			
		Record Drawing and document SUBMITTAL			
		Operations and Maintenance manual SUBMITTAL			
		Tools, spare parts, extra materials DELIVERY			
		System Startup testing REPORTS			
		Key DELIVERY			
		Substantial Completion Inspection REQUEST			
	03 30 00	Concrete Mix - Laboratory Design			
		Re-bar SHOP DWGS			
		Cement Materials CERTIF			
		Re-bar Material CERTIF			
		Formwork materials PD			
		Form release agent PD			
		Re-bar Accessories PD			
		Concrete Admixtures PD			
		Vapor Barrier PD			
		Evaporation Retarder PD			
		Curing Compound PD			
		Joint-filler strips PD			
		Epoxy Joint Fillers PD			
		Bonding Agent PD			
		Epoxy Bonding Adh PD			
		Repair underlayment PD			
		Repair Topping PD			
	03 40 00	Precast Materials PD			
		Precast Laboratory Mix Design			
		Precast SHOP DWGS			
		Precast Materials CERTIF			
	04 20 00	Masonry Samples			
		Masonry Mockup MATERIALS LIST			
		Masonry materials TEST REPORTS			
		Mortar LAB DESIGN			
		Mortar design TEST REPORT			
		Grout LAB DESIGN			
		Grout design TEST REPORT			
		Re-bar material CERTIF			
		Concrete Masonry units PD			
		Decorative CMU's PD			
		Brick PD			
		Mortar cement PD			
		Water-repellant admixture PD			
		Joint reinforcing PD			
		Masonry Ties and anchors PD			
		Metal thru-wall flashing PD			
		Elastomeric thru-wall flashing PD			
		Flashing adhesives, primers and seals PD			
		Compressible fill PD			

INITIAL SUBMITTAL INFORMATION					
SUBMITTAL #	SPEC SECTION	SUBMITTAL TITLE	FROM WHOM	Date Rcvd	# Rcvd
		Preformed CJ Gasket PD			
		Weep/vent PD			
		Cavity Drainage Material PD			
		Re-bar positioners PD			
		Masonry cleaners PD			
	04 72 00	Cast Stone Mockup MATERIALS LIST			
		Cast Stone PD			
		Cast Stone SHOP DWGS			
		Cast Stone material CERTIFICATES			
		Cast Stone SAMPLES			
	04 73 00	Stone Veneer Mockup MATERIALS LIST			
		Stone Veneer PD			
		Stone Veneer SAMPLES			
	05 12 00	Structural Steel SHOP DRAWINGS			
		Steel Connections STRUCTURAL ANALYSIS			
		Welding Qualification CERTIFICATES			
		Installer's QUALIFICATION DATA			
		Engineer's QUALIFICATION DATA			
		Fabricator's QUALIFICATION DATA			
		Structural Steel Mill TEST REPORTS			
		Structural Steel Mill Quality Control REPORTS			
	05 21 00	Steel Joist Fabricator QUALIFICATION DATA			
		Steel Joist STRUCTURAL ANALYSIS			
		Steel Joist Welding CERTIFICATES			
	05 31 00	Steel Deck PD			
		Steel Deck SHOP DRAWINGS			
		Steel Deck material CERTIFICATE			
		Steel Deck Welding CERTIFICATES			
	05 40 00	CF Steel Frame Engineer QUALIFICATION DATA			
		CF Steel Frame Fabricator QUALIFICATION DATA			
		CF Steel Frame STRUCTURAL ANALYSIS			
		CF Steel Frame Mill CERTIFICATES			
		CF Steel Frame Welding CERTIFICATES			
	05 44 00	CF Steel Truss Engineer QUALIFICATION DATA			
		CF Steel Truss Fabricator QUALIFICATION DATA			
		CF Steel Truss STRUCTURAL ANALYSIS			
		CF Steel Truss SHOP DRAWINGS			
	05 50 00	Misc Steel PD			
		Misc Steel SHOP DRAWINGS			
		Stair/railing STRUCTURAL ANALYSIS			
	05 70 00	Decorative Metal PD			
		Decorative Metal SHOP DRAWINGS			
	06 10 00	Arch Woodwork PD			
		Arch Woodwork SHOP DRAWINGS			
		Arch Woodwork Mockup MATERIALS LIST			
		Arch Woodwork SAMPLES			
	06 16 00	Sheathing PD			
	06 65 00	Simulated Woodwork PD			
		Simulated Woodwork SHOP DRAWINGS			
		Simulated Woodwork Mockup MATERIALS LIST			
	07 21 00	Building Insulation PD			
	07 24 19	EIFS PD			
		EIFS SHOP DRAWINGS			

INITIAL SUBMITTAL INFORMATION					
SUBMITTAL #	SPEC SECTION	SUBMITTAL TITLE	FROM WHOM	Date Rcvd	# Rcvd
		EIFS Mockup MATERIALS LIST			
		EIFS SAMPLES			
		EIFS Manufacturer's CERTIFICATES			
		EIFS Material TEST REPORTS			
		EIFS Maintenance DATA			
	07 32 16	Conc Roof Tile PD			
		Conc Roof Tile SAMPLES			
		Conc Roof Tile Mockup MATERIALS LIST			
		Conc Roof Tile Maintenance DATA			
		Conc Roof Tile WARRANTY			
	07 46 46	Siding PD			
	07 54 23	Roofing PD			
		Roofing SHOP DRAWINGS			
		Roofing Installers APPROVAL CERTIFICATE			
		Roofing Manufacturer's Material CERTIFICATE			
		Roofing Maintenance DATA			
		Roofing Manufacturer's Inspection REPORT			
	07 63 00	Sheet Metal PD			
		Sheet Metal SHOP DRAWINGS			
		Sheet Metal SAMPLES			
		Sheet Metal Mockup MATERIALS LIST			
	07 63 00	Sheet Metal Roofing Specialties PD			
		Sheet Metal Roofing Specialties SHOP DRAWINGS			
	07 72 00	Roof Accessories PD			
	07 84 00	Firestop Systems PD			
	07 92 00	Sealant PD			
		Sealant INITIAL SELECTION SAMPLES			
		Sealant FINAL VERIFICATION SAMPLES			
		Sealant Mockup MATERIALS LIST			
	08 11 13	Steel Door PD			
		Steel Door SHOP DRAWINGS			
	08 31 00	Access Doors PRODUCT DATA			
	08 36 13	Sectional Overhead Door PD			
	08 41 13	Aluminum Entrance & Storefront PD			
		Aluminum Entrance & Storefront SHOP DRAWINGS			
	08 52 13	Window PD			
		Window SHOP DRAWINGS			
		Window Maintenance DATA			
	08 71 00	Hardware PD			
		Hardware SCHEDULE			
	08 80 00	Glass PD			
	09 21 16	Drywall PD			
	09 31 13	Tile Veneer PD			
		Tile Veneer SAMPLES			
	09320	Thin-Brick PD			
		Thin-Brick SAMPLES			
	09 91 00	Paint Material PD			
		Paint Color SAMPLES			

SUBMITTAL SCHEDULE

SECTION 01 32 19

INITIAL SUBMITTAL INFORMATION					
SUBMITTAL #	SPEC SECTION	SUBMITTAL TITLE	FROM WHOM	Date Rcvd	# Rcvd
	09 97 24	Textured Coatings PD			
		Textured Coatings Color SAMPLES			
	10310	Chimney-top PD			
	10200	Louvers PD			
		Louvers SHOP DRAWINGS			
	10 74 13	Exterior Clock PD			
		Exterior Clock SHOP DRAWING			
	11 13 00	Loading Dock Equipment PD			
	31 20 00	Earthwork Materials TEST REPORTS			
	31 63 29	Drilled Concrete Piers PD			
		Drilled Concrete Piers REPORT			
		Drilled Concrete Piers			
		Drilled Concrete Piers			



► construction observation report

date:	XX MONTH XXXX	project:	PROJECT NAME
date/time of observation:	XX MONTH XXXX – 1:00 to 2:30 PM		Project Location / center Project City, State, Zip
attn:	Owner Contact Name, Title	project no.:	XXXXX.XXX
to:	OWNER COMPANY NAME Address City, State, Zip	copy(s) to:	all participants (noted below) and to: Consultant Company Consultant Company # 2
email:	name@email.com	via:	email ONLY

key participants in attendance (in addition to the Architect representative):
 Firstname, Lastname, Developer's representative
 Firstname Lastname, Superintendent, Contractor's Company Name
 Engineer Name, Engineer Company

weather conditions at the project site:
 [Partly cloudy, windy, 55 degrees F]

ongoing Work activities during the observation visit:
 [Masonry, exterior wall framing, roof joists]

- item #: observation comments:**
- 1.
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item #: observation comments:

24.

25.

26.

27.

This concludes my observations of the above referenced construction project. If you have any questions or comments, please contact me as soon as possible.

issued by the Architect:

Klover Architects, Inc.
by:

attachments:

The following are included as a part of this construction observation report to clarify the items noted:
- Photos of XX/XX/XX – 12 total
- Copy of Drawing A200 – for information

Architect Project Manager, Title

C:\Documents and Settings\hank\My Documents_new forms\01 32 29 - Construction Observation Report (KAI).doc

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and other Division-1 Sections of the Specifications, apply to this Section.

6 THIS SECTION INCLUDES administrative and procedural requirements for the following:
8 Periodic construction photographs.

8 RELATED SECTIONS include the following:
10 Division 1 Section "Submittal Procedures" for submitting construction photographs.
12 Division 1 Section "Closeout Procedures" for submitting digital photographic records as Project Record
Documents at Project closeout.

14 SUBMIT KEY PLAN of Project site and building with notation of vantage points marked for location and direction
16 of each photograph. Indicate elevation or story of construction. Include the same label information as the
corresponding set of photographs.

18 CONSTRUCTION PHOTOGRAPHS: Submit digital photos by email of each photographic view within two days
20 of taking photographs.

22 SUBMIT DIGITAL PHOTO IMAGES that have the same aspect ratio as the sensor, uncropped. With each photo,
digitally record the following information:
24 Name of Project.
Date photograph was taken.
26 Description of vantage point, indicating location, direction (by compass point), and elevation or story of
construction.

28 PROJECT RECORD PHOTOGRAPHS: Submit a complete set of digital image electronic files as a Project Record
30 Document.

PART 2 - PRODUCTS

32 PHOTOGRAPHIC MEDIA: Provide digital images in JPEG format, with minimum sensor size of 2.0 megapixels.

34 DATE STAMP: Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is
36 integral to photograph.

PART 3 - EXECUTION

40 PERIODIC CONSTRUCTION PHOTOGRAPHS: Take a minimum of ten (10) photographs on a weekly basis.
42 Select vantage points to best show status of construction and progress since the last photographs were taken.

44 FINAL COMPLETION CONSTRUCTION PHOTOGRAPHS: Take a minimum of one (1) photo in each room or
46 space and as many as are necessary to document finished conditions of the project before Owner occupancy. Take
adequate exterior photos to indicate all areas of the outside of the completed building.

END OF SECTION 01 32 33

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and other Division-1 Sections of the Specifications, apply to this Section.

6 THIS SECTION INCLUDES administrative and procedural requirements for submitting Shop Drawings, Product
8 Data, Samples, and other informational submittals. Include all costs for copies/reproductions, mailing/courier
service, distribution and other incidental costs related to the Submittal process within the Contract Sum.

10 ELECTRONIC SUBMITTALS: In order to conserve paper, limit delivery/courier expenses, and to expedite the
12 review process, provide electronic submittals to the greatest extent feasible. Maintain one (1) set of printed,
approved submittals at the Project Site, complete with applicable review and approval comments.

14 ADMINISTRATIVE SUBMITTALS: Refer to other Division-1 Sections for requirements of administrative
16 submittals, including but not limited to Applications for Payment, Performance and Payment Bonds, Insurance
Certificates, and the List of Subcontractors.

18 THE ARCHITECT WILL ONLY REVIEW submittals that have been reviewed and identified as “approved” by the
20 General Contractor as being complete and in compliance with the Contract Documents.

22 DEVIATIONS FROM SPECIFIED MATERIALS OR EQUIPMENT must be indicated in a separate request for
24 Substitution, if approved has not been previously granted by Addenda or a contract modification after award of the
Contract.

26 DEFINITIONS

28 ACTION SUBMITTALS: Written and graphic information that requires Architect's responsive action.

30 INFORMATIONAL SUBMITTALS: Written information that does not require Architect’s approval. Informational
32 submittals may be rejected by the Architect for not complying with requirements of the Contract Documents.

34 SUBMITTAL PROCEDURES

36 ELECTRONIC MEDIA FILES of a limited number of Construction Documents (typically Floor Plans and
38 Elevations) may be available from the Architect and the consulting Engineers upon written (or email) request.
Transmittal of Electronic Media files will require the user’s execution of an Electronic Media Release form defining
40 the specific terms, limits, and responsibilities for use, and prior payment of a Transmittal Service and Handling Fee
(amount to be determined upon request based on quantity of drawings requested - minimum service fee of \$250.00).
42 Availability of electronic media files by the Architect or Engineers is considered a convenience at their discretion,
and is not guaranteed.

44 COORDINATE PREPARATION AND PROCESSING of submittals with performance of construction activities.
46 Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that
require sequential activity. Coordinate transmittal of different types of submittals for related parts of the Work so
48 processing will not be delayed because of need to review submittals concurrently for coordination. Architect
reserves the right to withhold action on a submittal requiring coordination with other submittals until related
50 submittals are received.

52 SUBMITTAL SCHEDULE

54 AFTER ACCEPTANCE of the Contractor's Construction Schedule, prepare a Submittal Schedule. Submit within 10
56 days of the date required for submittal of the Contractor's Construction Schedule. Coordinate Submittal Schedule
with the list of subcontracts, Schedule of Values, and the list of products as well as the Contractor's Construction
58 Schedule. Prepare the schedule in chronological order. Revise the schedule after each activity where revisions have
been recognized or made. Issue the updated schedule concurrently with the report of each meeting. Provide the
following information with the Submittal Schedule:

- 60 Scheduled date for the first submittal.
- 62 Related Section number.
- Submittal category (Shop Drawings, Product Data, or Samples).
- 64 Name of the subcontractor.
- Description of the part of the Work covered.
- 66 Scheduled date for resubmittal.
- Scheduled date for the Architect's final release or approval.

PROCESSING TIME: Allow enough time for submittal review, including time for re-submittals, as follows (time for review shall commence on Architect's receipt of submittal):

INITIAL REVIEW: Allow 10 business days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

CONCURRENT REVIEW: Where concurrent review of submittals by Architect's consultants, Owner, or other parties is required, allow 10 business days for initial review of each submittal.

DIRECT TRANSMITTAL TO CONSULTANT: Where the Contract Documents indicate that submittals may be transmitted directly to Architect's consultants, provide duplicate copy of transmittal to the Architect. Submittal will be returned to Architect before being returned to Contractor.

IF INTERMEDIATE SUBMITTAL IS NECESSARY, process it in same manner as initial submittal.

ALLOW 10 BUSINESS DAYS for processing each resubmittal.

NO EXTENSION OF THE CONTRACT TIME will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.

SUBMITTAL IDENTIFICATION: Place a permanent label or title block on each submittal for identification.

INDICATE NAME OF FIRM or entity that prepared each submittal on label or title block.

PROVIDE SPACE approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.

INCLUDE THE FOLLOWING INFORMATION on label for processing and recording action taken:

Project name.

Date.

Name and address of Architect.

Name and address of Contractor.

Name and address of subcontractor.

Name and address of supplier.

Name of manufacturer.

Unique identifier, including revision number.

Number and title of appropriate Specification Section.

Drawing number and detail references, as appropriate.

Other necessary identification.

DEVIATIONS: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.

ADDITIONAL COPIES: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions of the Contract Documents, initial submittal may serve as final submittal. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect. Additional copies submitted for maintenance manuals will be marked with action taken and will be returned.

TRANSMITTALS: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor.

ON AN ATTACHED SEPARATE SHEET, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements of the Contract Documents, including minor variations and limitations. Include the same label information as the related submittal.

INCLUDE CONTRACTOR'S CERTIFICATION stating that information submitted complies with requirements of the Contract Documents.

TRANSMITTAL FORM: Use CSI Form 12.1A (included at end of this Section) or an approved equivalent to provide the following information:

Project name.

Date.

Destination (To:).

Source (From:).

Names of subcontractor, manufacturer, and supplier.

Category and type of submittal.

Submittal purpose and description.

Submittal and transmittal distribution record.

Remarks.

Signature of transmitter.

ELECTRONIC TRANSMITTALS: Assemble all components of each submittal appropriately for transmittal and handling into a single electronic mail (e-mail) file. Include all requirements of "transmittals" as indicated above within the electronic file.

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.

2 USE FOR CONSTRUCTION: Use only final submittals with mark indicating action taken by Architect in connection with construction.

4 PART 2 – PRODUCTS

6 ACTION SUBMITTALS

8 PREPARE AND SUBMIT ACTION SUBMITTALS required by individual Specification Sections.

10 NUMBER OF COPIES OF SHOP DRAWINGS: SUBMIT FOUR (4) printed copies, in addition to the electronic transmittal. Architect may retain up to three (3) copies (for Architect, Consultant and Owner); remainder will be returned.

14 PRODUCT DATA: Collect information into a single electronic submittal for each element of construction and type of product or equipment.

16 If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.

18 Mark each copy of each submittal to show which products and options are applicable.

18 Include the following information, as applicable:

20 Manufacturer's written recommendations.

22 Manufacturer's product specifications.

22 Manufacturer's installation instructions.

24 Standard color charts.

24 Manufacturer's catalog cuts.

26 Wiring diagrams showing factory-installed wiring.

26 Printed performance curves.

28 Operational range diagrams.

28 Mill reports.

30 Standard product operating and maintenance manuals.

30 Compliance with recognized trade association standards.

32 Compliance with recognized testing agency standards.

32 Application of testing agency labels and seals.

34 Notation of coordination requirements.

36 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.

38 PREPARATION: Include the following information, as applicable:

38 Dimensions.

40 Identification of products.

40 Fabrication and installation drawings.

42 Roughing-in and setting diagrams.

42 Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.

44 Shopwork manufacturing instructions.

44 Templates and patterns.

46 Schedules.

46 Design calculations.

48 Compliance with specified standards.

48 Notation of coordination requirements.

50 Notation of dimensions established by field measurement.

50 WIRING DIAGRAMS: Differentiate between manufacturer-installed and field-installed wiring.

52 SHEET SIZE: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 40 inches.

54 COORDINATION DRAWINGS: Comply with requirements in Division 1 Section "Project Management and Coordination."

56 SAMPLES: Prepare physical units of materials or products, including the following:

58 COMPLY WITH requirements in Division 1 Section "Quality Requirements" for mockups.

60 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.

62 SAMPLES FOR VERIFICATION: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the 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.

2 PREPARATION: Mount, display, or package Samples in manner specified to facilitate review of qualities
3 indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on
4 unexposed side that includes the following:

- 5 Generic description of Sample.
- 6 Product name or name of manufacturer.
- 7 Sample source.

8 ADDITIONAL INFORMATION: On an attached separate sheet, prepared on Contractor's letterhead,
9 provide the following:

- 10 Size limitations.
- 11 Compliance with recognized standards.
- 12 Availability.
- 13 Delivery time.

14 SUBMIT SAMPLES FOR REVIEW of kind, color, pattern, and texture for a final check of these
15 characteristics with other elements and for a comparison of these characteristics between final
16 submittal and actual component as delivered and installed.

17 If variation in color, pattern, texture, or other characteristic is inherent in the product
18 represented by a Sample, submit at least three sets of paired units that show
19 approximate limits of the variations.

20 Refer to individual Specification Sections for requirements for Samples that illustrate
21 workmanship, fabrication techniques, details of assembly, connections,
22 operation, and similar construction characteristics.

23 NUMBER OF SAMPLES FOR VERIFICATION: Submit three (3) sets of Samples. Architect will retain
24 one Sample sets; remainder will be returned. Submit a single Sample where assembly details,
25 workmanship, fabrication techniques, connections, operation, and other similar characteristics are
26 to be demonstrated.

27 DISPOSITION: Maintain sets of approved Samples at Project site, available for quality-control
28 comparisons throughout the course of construction activity. Sample sets may be used to determine
29 final acceptance of construction associated with each set. Samples that may be incorporated into
30 the Work are indicated in individual Specification Sections. Such Samples must be in an
31 undamaged condition at time of use. Samples not incorporated into the Work, or otherwise
32 designated as Owner's property, are the property of Contractor.

33 PRODUCT SCHEDULE OR LIST: Prepare a written summary indicating types of products required for the Work
34 and their intended location. Include the following information in tabular form:

- 35 Type of product. Include unique identifier for each product.
- 36 Number and name of room or space.
- 37 Location within room or space.

38 DELEGATED-DESIGN SUBMITTAL: Comply with requirements in Division 1 Section "Quality Requirements."

39 CONTRACTOR'S CONSTRUCTION SCHEDULE: Comply with requirements in Division 1 Section "Construction
40 Progress Documentation" for Construction Manager's action.

41 SUBMITTALS SCHEDULE: Comply with requirements in Division 1 Section "Construction Progress
42 Documentation."

43 APPLICATION FOR PAYMENT: Comply with requirements in Division 1 Section "Payment Procedures."

44 SCHEDULE OF VALUES: Comply with requirements in Division 1 Section "Payment Procedures."

45 PRELIMINARY SUPPLIERS LIST: Prepare a written summary identifying sub-contractors, 2nd-tier
46 subcontractors, and suppliers proposed for each portion of the Work, including those who are to furnish products or
47 equipment fabricated to a special design. Use CSI Form 1.5A (included at end of this Section) or an approved
48 equivalent form that indicates the following information in tabular form:

- 49 Name, address, and telephone number of entity performing subcontract or supplying products.
- 50 Number and title of related Specification Section(s) covered by subcontract.
- 51 Drawing number and detail references, as appropriate, covered by subcontract.

52 INFORMATIONAL SUBMITTALS

53 PREPARE AND SUBMIT ELECTRONIC INFORMATIONAL SUBMITTALS required by other Specification
54 Sections. Maintain one (1) printed set of informational submittals at the Project Site.

55 CERTIFICATES AND CERTIFICATIONS: Provide a notarized statement that includes signature of entity
56 responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual
57 authorized to sign documents on behalf of that entity.

58 TEST AND INSPECTION REPORTS: Comply with requirements in Division 1 Section "Quality Requirements."
59

2 CONTRACTOR'S CONSTRUCTION SCHEDULE: Comply with requirements in Division 1 Section "Construction Progress Documentation."

4 QUALIFICATION DATA: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

8 PRODUCT CERTIFICATES: Prepare written statements on manufacturer's letterhead certifying that product complies with requirements.

10 WELDING CERTIFICATES: Prepare written certification that welding procedures and personnel comply with requirements. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.

14 INSTALLER CERTIFICATES: Prepare written statements on manufacturer's letterhead certifying that Installer complies with requirements and, where required, is authorized for this specific Project.

18 MANUFACTURER CERTIFICATES: Prepare written statements on manufacturer's letterhead certifying that manufacturer complies with requirements. Include evidence of manufacturing experience where required.

20 MATERIAL CERTIFICATES: Prepare written statements on manufacturer's letterhead certifying that material complies with requirements.

24 MATERIAL TEST REPORTS: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.

26 PRECONSTRUCTION TEST REPORTS: Prepare 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.

30 COMPATIBILITY TEST REPORTS: Prepare 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.

34 FIELD TEST REPORTS: Prepare reports written by a qualified testing agency, on testing agency's standard form, 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.

38 PRODUCT TEST REPORTS: Prepare written reports indicating current product produced by manufacturer complies with requirements. 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.

42 RESEARCH/EVALUATION REPORTS: Prepare 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:

- 46 Name of evaluation organization.
- 48 Date of evaluation.
- Time period when report is in effect.
- Product and manufacturers' names.
- 50 Description of product.
- Test procedures and results.
- 52 Limitations of use.

54 MAINTENANCE DATA: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Closeout Procedures."

56 DESIGN DATA: Prepare written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

62 MANUFACTURER'S INSTRUCTIONS: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:

- 66 Preparation of substrates.
- Required substrate tolerances.
- Sequence of installation or erection.
- 68 Required installation tolerances.
- Required adjustments.
- 70 Recommendations for cleaning and protection.

2 MANUFACTURER'S FIELD REPORTS: Prepare written information documenting factory-authorized service
representative's tests and inspections. Include the following, as applicable:

4 Name, address, and telephone number of factory-authorized service representative making report.

6 Statement on condition of substrates and their acceptability for installation of product.

8 Statement that products at Project site comply with requirements.

10 Summary of installation procedures being followed, whether they comply with requirements and, if not,
what corrective action was taken.

12 Results of operational and other tests and a statement of whether observed performance complies with
requirements.

Statement whether conditions, products, and installation will affect warranty.

Other required items indicated in individual Specification Sections.

14 INSURANCE CERTIFICATES AND BONDS: Prepare written information indicating current status of insurance or
bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles,
16 if any, and term of the coverage.

18 MATERIAL SAFETY DATA SHEETS: Submit information directly to Owner. If submitted to Architect, Architect
will not review this information but will return it with no action taken.

22 **PART 3 - EXECUTION**

24 **CONTRACTOR'S REVIEW**

26 REVIEW EACH SUBMITTAL and check for compliance with the Contract Documents. Note corrections and field
dimensions. Identify as "approved" with electronic transmittal before submitting to Architect.

28 CONTRACTOR'S APPROVAL: Mark or otherwise indicate review and approval of each submittal on the
electronic transmittal to the Architect. Include Project name and location, submittal number, Specification Section
30 title and number, name of reviewer, date of Contractor's approval, and Contractor's statement certifying that
submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

34 **ARCHITECT'S ACTION**

36 CHECKING AND APPROVAL of shop drawings is a gratuitous assistance by the Architect and does not relieve the
Contractor from responsibility for errors or omissions which may exist in the submitted data. Compliance with
38 specified characteristics is the Contractor's responsibility. Where errors or omissions are discovered later, they must
be corrected without additional cost to the Owner, regardless of any review or approval by the Architect.

40 ARCHITECT'S ACTION: The Architect (or consulting Engineer) will indicate review status and action required, as
42 follows:

44 APPROVED: No deviations from the design concept have been found.

APPROVED AS NOTED: deviations from the design concept which have been found are noted, and the
Contractor may proceed accordingly.

46 REVISE & RESUBMIT: the submittal must be revised and resubmitted in response to the notation
indicated.

48 REJECTED: the submittal does not conform to the design concept or meet the requirements of the Contract
Documents.

50 ARCHITECT WILL NOT REVIEW submittals that do not bear Contractor's approval and will return them without
52 action.

54 OTHER ACTION: Where a submittal is forwarded for information or record purposes only, no action by the
Architect will be taken.

56 THE ARCHITECT WILL REVIEW submittals, mark to indicate action taken, and return promptly, except for
58 submittals for the record or information, where action and return is not required.

60 SUBMITTALS NOT REQUIRED by the Contract Documents will not be reviewed.

62 **USE OF SUBMITTALS AT THE JOBSITE:**

64 MAINTAIN ONE (1) PRINTED COPY of all approved submittals at the jobsite, in good order and available for
66 reverence by the Owner and/or Architect. "Rejected" submittals shall NOT be permitted on the jobsite.

68 CONSTRUCTION WORK executed before receipt of approved submittals will be provided at the Contractor's risk.

2 **ATTACHMENTS TO THIS SECTION:**

4 CSI Form 12.1A: SUBMITTAL TRANSMITTAL

6 CSI Form 1.5A: SUBCONTRACTORS AND MAJOR MATERIALS SUPPLIERS LIST

8

END OF SECTION 01 33 00



SUBMITTAL TRANSMITTAL

Project: _____ Date: _____
A/E Project Number: _____

TRANSMITTAL A To (Contractor): _____ Date: _____ Submittal No. _____
From (Subcontractor): _____ By: _____ Resubmission

Qty.	Reference / Number	Title / Description / Manufacturer	Spec. Section Title and Paragraph / Drawing Detail Reference

- | | |
|--|---|
| <input type="checkbox"/> Submitted for review and approval | <input type="checkbox"/> Substitution involved - Substitution request attached |
| <input type="checkbox"/> Resubmitted for review and approval | <input type="checkbox"/> If substitution involved, submission includes point-by-point comparative data or preliminary details |
| <input type="checkbox"/> Complies with contract requirements | <input type="checkbox"/> Items included in submission will be ordered immediately upon receipt of approval |
| <input type="checkbox"/> Will be available to meet construction schedule | |
| <input type="checkbox"/> A/E review time included in construction schedule | |
- Other remarks on above submission: _____ One copy retained by sender

TRANSMITTAL B To (A/E): _____ Attn: _____ Date Rec'd by Contractor: _____
From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

- | | |
|--|--|
| <input type="checkbox"/> Approved | <input type="checkbox"/> Revise / Resubmit |
| <input type="checkbox"/> Approved as noted | <input type="checkbox"/> Rejected / Resubmit |
- Other remarks on above submission: _____ One copy retained by sender

TRANSMITTAL C To (Contractor): _____ Attn: _____ Date Rec'd by A/E: _____
From (A/E): _____ Other By: _____ Date Trnsmt'd by A/E: _____

- | | |
|---|--|
| <input type="checkbox"/> Approved | <input type="checkbox"/> Provide file copy with corrections identified |
| <input type="checkbox"/> Approved as noted | <input type="checkbox"/> Sepia copies only returned |
| <input type="checkbox"/> Not subject to review | <input type="checkbox"/> Point-by-point comparative data required to complete approval process |
| <input type="checkbox"/> No action required | <input type="checkbox"/> Submission Incomplete / Resubmit |
| <input type="checkbox"/> Revise / Resubmit | |
| <input type="checkbox"/> Rejected / Resubmit | |
| <input type="checkbox"/> Approved as noted / Resubmit | |
- Other remarks on above submission: _____ One copy retained by sender

TRANSMITTAL D To (Subcontractor): _____ Attn: _____ Date Rec'd by Contractor: _____
From (Contractor): _____ By: _____ Date Trnsmt'd by Contractor: _____

Copies: Owner Consultants _____ _____ _____ One copy retained by sender



Advancement
of Construction
Technology

SUBCONTRACTORS AND MAJOR MATERIAL SUPPLIERS LIST

Project: _____

 To (A/E): _____

From (Contractor): _____
 Date: _____
 A/E Project Number: _____
 Contract For: _____

List Subcontractors and Major Material Suppliers proposed for use on this Project as required by the Construction Documents. Attach supplemental sheets if necessary.

Section Number	Section Title	Firm	Address	Phone Number (Fax Number)	Contact
-------------------	------------------	------	---------	------------------------------	---------

Attachments

Signed by: _____ Date: _____

Copies: Owner Consultants _____ _____ _____ _____ _____ _____ File

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. Testing and inspecting 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 -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
 - 4. Specific test and inspection requirements are not specified in this Section.

1.3 DEFINITIONS

- A. 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.
- B. 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. Services do not include contract enforcement activities performed by Architect.
- C. 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.
- D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. 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, 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).
- I. Experienced: When used with an entity or individual, "experienced" 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.

1.4 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards 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 a decision 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.

1.5 ACTION SUBMITTALS

- A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
 - 1. Indicate manufacturer and model number of individual components.
 - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Contractor's quality-control personnel.
- B. 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.

1.7 REPORTS AND DOCUMENTS

- A. 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, and telephone number 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 inspecting.
 - 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.
- B. 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, and telephone number 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.
- C. 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, and telephone number 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.
- D. 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.

1.8 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.
- 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, 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 products 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 inspecting 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.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.

2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
 - 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. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 - d. When testing is complete, remove test specimens, assemblies, and mockups; do not reuse products on Project.
 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
 - K. 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 in location and of size indicated or, if not indicated, as directed by Architect.
 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 7. Demolish and remove mockups when directed unless otherwise indicated.
 - L. Integrated Exterior Mockups: Construct integrated exterior mockup according to approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials.
- 1.9 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 inspecting they are engaged to perform.

2. 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.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
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 these 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 inspecting 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 inspecting 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. 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."
- D. 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 pre-installation 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.
- E. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location 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 any duties of Contractor.

- G. Associated Services: Cooperate with agencies 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 inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 6. Security and protection for samples and for testing and inspecting equipment at Project site.
- H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.10 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: Owner will engage a qualified special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

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 reference during normal working hours.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, 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

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and other Division-1 Sections of the Specifications, apply to this Section.

DEFINITIONS

8 BASIC CONTRACT DEFINITIONS are included in the Conditions of the Contract.

10 "APPROVED": When used to convey Architect's action on Contractor's submittals, applications, and requests,
12 "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.

14 "DIRECTED": A command or instruction by Architect. Other terms including "requested," "authorized,"
16 "selected," "approved," "required," and "permitted" have the same meaning as "directed."

18 "INDICATED": Requirements expressed by graphic representations or in written form on Drawings, in
20 Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and
22 "specified" have the same meaning as "indicated."

24 "REGULATIONS": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and
26 rules, conventions, and agreements within the construction industry that control performance of the Work.

28 "FURNISH": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar
30 operations.

32 "INSTALL": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting,
34 placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

36 "PROVIDE": Furnish and install, complete and ready for the intended use.

38 "INSTALLER": Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-
40 subcontractor, to perform a particular construction operation, including installation, erection, application, and similar
42 operations. Using a term such as "carpentry" does not imply that certain construction activities must be performed
44 by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply
46 that requirements specified apply exclusively to tradespeople of the corresponding generic name.

48 "EXPERIENCED": When used with an entity, "experienced" means having successfully completed a minimum of
50 five (5) previous projects similar in size and scope to this Project; being familiar with special requirements
52 indicated; and having complied with requirements of authorities having jurisdiction.

54 "PROJECT SITE": Space available for performing construction activities. The extent of Project site is shown on
56 Drawings and may or may not be identical with the description of the land on which Project is to be built.

INDUSTRY STANDARDS

48 APPLICABILITY OF STANDARDS: Unless the Contract Documents include more stringent requirements,
50 applicable construction industry standards have the same force and effect as if bound or copied directly into the
52 Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by
54 reference.

56 PUBLICATION DATES: Comply with standards in effect as of date of the Contract Documents, unless otherwise
58 indicated.

60 CONFLICTING REQUIREMENTS: If compliance with two or more standards is specified and the standards
62 establish different or conflicting requirements for minimum quantities or quality levels, comply with the most
64 stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for
66 a decision before proceeding. 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.

COPIES OF STANDARDS: Each entity engaged in construction on Project must be familiar with industry
standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract
Documents. Where copies of standards are needed to perform a required construction activity, obtain copies directly

REFERENCES

from publication source as required for performance and completion of the Work, and make the standards available on request.

ABBREVIATIONS AND ACRONYMS FOR 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. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents:

ADA & ADAAG	AMERICANS WITH DISABILITIES ACT (ADA) Accessibility Guidelines for Buildings and Facilities Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-5434
CFR	CODE OF FEDERAL REGULATIONS Available from Government Printing Office www.access.gpo.gov/nara/cfr	(888) 293-6498 (202) 512-1530
CRD	HANDBOOK FOR CONCRETE AND CEMENT Available from Army Corps of Engineers Waterways Experiment Station www.wes.army.mil	(601) 634-2355
DOD	DEPARTMENT OF DEFENSE Specifications And Standards Available from Defense Automated Printing Service www.astimage.daps.dla.mil/online	(215) 697-6257
FED-STD	FEDERAL STANDARD (See FS)	
FS	FEDERAL SPECIFICATION Available from Defense Automated Printing Service www.astimage.daps.dla.mil/online	(215) 697-6257
	Available from General Services Administration www.fss.gsa.gov/pub/fed-specs.cfm	(202) 619-8925
	Available from National Institute of Building Sciences www.nibs.org	(202) 289-7800
FTMS	FEDERAL TEST METHOD STANDARD (See FS)	
MILSPEC	MILITARY SPECIFICATION AND STANDARDS Available from Defense Automated Printing Service www.astimage.daps.dla.mil/online	(215) 697-6257
UFAS	UNIFORM FEDERAL ACCESSIBILITY STANDARDS Available from Access Board www.access-board.gov	(800) 872-2253 (202) 272-5434

ABBREVIATIONS AND ACRONYMS

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 Research's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

INDUSTRY ORGANIZATIONS: 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. Names, telephone numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents:

AA	ALUMINUM ASSOCIATION, INC. (The) www.aluminum.org	(202) 862-5100
AAADM	AMERICAN ASSOCIATION OF AUTOMATIC DOOR MANUFACTURERS www.aaadm.com	(216) 241-7333

REFERENCES**SECTION 01 42 00**

Box – New Longview, Lot 44

Klover Project No. 23150.001

AABC	ASSOCIATED AIR BALANCE COUNCIL www.aabchq.com	(202) 737-0202
AAMA	AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION www.aamanet.org	(847) 303-5664
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS www.aashto.org	(202) 624-5800
ACI	AMERICAN CONCRETE INSTITUTE/ACI INTERNATIONAL www.aci-int.org	(248) 848-3700
AF&PA	AMERICAN FOREST & PAPER ASSOCIATION www.afandpa.org	(800) 878-8878 (202) 463-2700
AGA	AMERICAN GAS ASSOCIATION www.aga.org	(202) 824-7000
AGC	ASSOCIATED GENERAL CONTRACTORS OF AMERICA (The) www.agc.org	(703) 548-3118
AHA	AMERICAN HARDBOARD ASSOCIATION www.hardboard.org	(847) 934-8800
AIA	AMERICAN INSTITUTE OF ARCHITECTS (The) www.aia.org	(800) 242-3837 (202) 626-7300
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION www.aisc.org	(800) 644-2400 (312) 670-2400
AISI	AMERICAN IRON AND STEEL INSTITUTE www.steel.org	(202) 452-7100
ALSC	AMERICAN LUMBER STANDARD COMMITTEE	(301) 972-1700
AMCA	AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL www.amca.org	(847) 394-0150
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE www.ansi.org	(202) 293-8020
ARI	AIR-CONDITIONING & REFRIGERATION INSTITUTE www.ari.org	(703) 524-8800
ASHRAE	AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR- CONDITIONING ENGINEERS www.ashrae.org	(800) 527-4723 (404) 636-8400
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS INTERNATIONAL www.asme.org	(800) 843-2763 (212) 591-7722
ASSE	AMERICAN SOCIETY OF SANITARY ENGINEERING www.asse-plumbing.org	(440) 835-3040
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS www.astm.org	(610) 832-9585
AWCI	ASSOCIATION OF THE WALL AND CEILING INDUSTRIES www.awci.org	(703) 534-8300
AWI	ARCHITECTURAL WOODWORK INSTITUTE www.awinet.org	(800) 449-8811 (703) 733-0600
AWPA	AMERICAN WOOD-PRESERVERS' ASSOCIATION www.awpa.com	(817) 326-6300
AWS	AMERICAN WELDING SOCIETY www.aws.org	(800) 443-9353 (305) 443-9353

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AWWA	AMERICAN WATER WORKS ASSOCIATION www.awwa.org	(800) 926-7337 (303) 794-7711
BHMA	BUILDERS HARDWARE MANUFACTURERS ASSOCIATION www.buildershardware.com	(212) 297-2122
BIA	BRICK INDUSTRY ASSOCIATION (The) www.bia.org	(703) 620-0010
CCC	CARPET CUSHION COUNCIL www.carpetcushion.org	(203) 637-1312
CCFSS	CENTER FOR COLD-FORMED STEEL STRUCTURES www.umn.edu/~ccfss	(573) 341-4471
CDA	COPPER DEVELOPMENT ASSOCIATION INC. www.copper.org	(800) 232-3282 (212) 251-7200
CIMA	CELLULOSE INSULATION MANUFACTURERS ASSOCIATION www.cellulose.org	(888) 881-2462 (937) 222-2462
CISCA	CEILINGS & INTERIOR SYSTEMS CONSTRUCTION ASSOCIATION www.cisca.org	(630) 584-1919
CISPI	CAST IRON SOIL PIPE INSTITUTE www.cispi.org	(423) 892-0137
CRI	CARPET & RUG INSTITUTE (The) www.carpet-rug.com	(800) 882-8846 (706) 278-3176
CRSI	CONCRETE REINFORCING STEEL INSTITUTE www.crsi.org	(847) 517-1200
CSI	CONSTRUCTION SPECIFICATIONS INSTITUTE (The) www.csinet.org	(800) 689-2900 (703) 684-0300
DHI	DOOR AND HARDWARE INSTITUTE www.dhi.org	(703) 222-2010
EIMA	EIFS INDUSTRY MEMBERS ASSOCIATION www.eifsfacts.com	(800) 294-3462 (770) 968-7945
EJMA	EXPANSION JOINT MANUFACTURERS ASSOCIATION, INC. www.ejma.org	(914) 332-0040
FCI	FLUID CONTROLS INSTITUTE www.fluidcontrolsintitute.org	(216) 241-7333
FMG	FM GLOBAL www.fmglobal.com	(401) 275-3000
FSC	FOREST STEWARDSHIP COUNCIL www.fscoax.org	52 951 5146905
GA	GYPSUM ASSOCIATION www.gypsum.org	(202) 289-5440
GANNA	GLASS ASSOCIATION OF NORTH AMERICA (Formerly: FGMA - Flat Glass Marketing Association) www.glasswebsite.com/ganna	(785) 271-0208
HPVA	HARDWOOD PLYWOOD & VENEER ASSOCIATION www.hpva.org	(703) 435-2900
HPW	H. P. WHITE LABORATORY, INC. www.hpwhite.com	(410) 838-6550
ICEA	INSULATED CABLE ENGINEERS ASSOCIATION, INC. www.icea.net	(770) 830-0369

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ICRI	INTERNATIONAL CONCRETE REPAIR INSTITUTE, INC. www.icri.org	(847) 827-0830
IEC	INTERNATIONAL ELECTROTECHNICAL COMMISSION www.iec.ch	41 22 919 02 11
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC. www.ieee.org	(212) 419-7900
IESNA	ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA www.iesna.org	(212) 248-5000
IGCC	INSULATING GLASS CERTIFICATION COUNCIL www.igcc.org	(315) 646-2234
IGMA	INSULATING GLASS MANUFACTURERS ALLIANCE (THE) www.igmaonline.org	(613) 233-1510
ISSFA	INTERNATIONAL SOLID SURFACE FABRICATORS ASSOCIATION	(702) 567-8150
LPI	LIGHTNING PROTECTION INSTITUTE www.lightning.org	(800) 488-6864 (847) 577-7200
MFMA	METAL FRAMING MANUFACTURERS ASSOCIATION www.metalframingmfg.org	(312) 644-6610
MPI	MASTER PAINTERS INSTITUTE www.paintinfo.com	(888) 674-8937
MSS	MANUFACTURERS STANDARDIZATION SOCIETY of The Valve and Fittings Industry Inc. www.mss-hq.com	(703) 281-6613
NAAMM	NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS www.naamm.org	(312) 332-0405
NACE	NATIONAL ASSOCIATION OF CORROSION ENGINEERS INTERNATIONAL www.nace.org	(281) 228-6200
NAIMA	NORTH AMERICAN INSULATION MANUFACTURERS ASSOCIATION www.naima.org	(703) 684-0084
NCMA	NATIONAL CONCRETE MASONRY ASSOCIATION www.ncma.org	(703) 713-1900
NCPI	NATIONAL CLAY PIPE INSTITUTE www.ncpi.org	(414) 248-9094
NCTA	NATIONAL CABLE & TELECOMMUNICATIONS ASSOCIATION www.ncta.com	(202) 775-3550
NEBB	NATIONAL ENVIRONMENTAL BALANCING BUREAU www.nebb.org	(301) 977-3698
NECA	NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION www.necanet.org	(301) 657-3110
NeLMA	NORTHEASTERN LUMBER MANUFACTURERS' ASSOCIATION www.nelma.org	(207) 829-6901
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION www.nema.org	(703) 841-3200
NETA	InterNATIONAL ELECTRICAL TESTING ASSOCIATION www.netaworld.org	(303) 697-8441
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION www.nfpa.org	(800) 344-3555 (617) 770-3000

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NFRC	NATIONAL FENESTRATION RATING COUNCIL www.nfrc.org	(301) 589-6372
NGA	NATIONAL GLASS ASSOCIATION www.glass.org	(703) 442-4890
NHLA	NATIONAL HARDWOOD LUMBER ASSOCIATION www.natlhardwood.org	(800) 933-0318 (901) 377-1818
NLGA	NATIONAL LUMBER GRADES AUTHORITY www.nlga.org	(604) 524-2393
NRCA	NATIONAL ROOFING CONTRACTORS ASSOCIATION www.nrca.net	(800) 323-9545 (847) 299-9070
NRMCA	NATIONAL READY MIXED CONCRETE ASSOCIATION www.nrmca.org	(888) 846-7622 (301) 587-1400
NSF	NATIONAL SANITATION FOUNDATION INTERNATIONAL www.nsf.org	(800) 673-6275 (734) 769-8010
NSSGA	NATIONAL STONE, SAND & GRAVEL ASSOCIATION (Formerly: NSA - National Stone Association) www.nssga.org	(800) 342-1415 (703) 525-8788
PCI	PRECAST/PRESTRESSED CONCRETE INSTITUTE www.pci.org	(312) 786-0300
PDCA	PAINTING AND DECORATING CONTRACTORS OF AMERICA www.pdca.com	(800) 332-7322 (703) 359-0826
PDI	PLUMBING & DRAINAGE INSTITUTE www.pdionline.org	(800) 589-8956 (508) 230-3516
RCSC	RESEARCH COUNCIL ON STRUCTURAL CONNECTIONS www.boltcouncil.org	(800) 644-2400 (312) 670-2400
RFCI	RESILIENT FLOOR COVERING INSTITUTE www.rfci.com	
RIS	REDWOOD INSPECTION SERVICE www.calredwood.org	(888) 225-7339 (415) 382-0662
SAE	SAE INTERNATIONAL www.sae.org	(724) 776-4841
SDI	STEEL DECK INSTITUTE www.sdi.org	(847) 462-1930
SDI	STEEL DOOR INSTITUTE www.steeldoor.org	(440) 899-0010
SGCC	SAFETY GLAZING CERTIFICATION COUNCIL www.sgcc.org	(315) 646-2234
SJI	STEEL JOIST INSTITUTE www.steeljoist.org	(843) 626-1995
SMA	SCREEN MANUFACTURERS ASSOCIATION www.screenmfgassociation.org	(561) 533-0991
SMACNA	SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION www.smacna.org	(703) 803-2980
SPFA	SPRAY POLYURETHANE FOAM ALLIANCE (Formerly: SPI/SPFD - The Society of the Plastics Industry, Inc.; Spray Polyurethane Foam Division) www.sprayfoam.org	(800) 523-6154

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SPIB	SOUTHERN PINE INSPECTION BUREAU (The) www.spib.org	(850) 434-2611
SPI/SPFD	SOCIETY OF THE PLASTICS INDUSTRY (The) Spray Polyurethane Foam Division (See SPFA)	
SPRI	SINGLE PLY ROOFING INSTITUTE www.spri.org	(781) 444-0242
SSINA	SPECIALTY STEEL INDUSTRY OF NORTH AMERICA www.ssina.com	(800) 982-0355 (202) 342-8630
SSMA	STEEL STUD MANUFACTURERS ASSOCIATION (Formerly: ML/SFA - Metal Lath/Steel Framing Association) www.ssma.com	(312) 456-5590
SSPC	SOCIETY FOR PROTECTIVE COATINGS www.sspc.org	(877) 281-7772 (412) 281-2331
STI	STEEL TANK INSTITUTE www.steel tank.com	(847) 438-8265
SWRI	SEALANT, WATERPROOFING, AND RESTORATION INSTITUTE www.swrionline.org	(816) 472-7974
TCA	TILE COUNCIL OF AMERICA, INC. www.tileusa.com	(864) 646-8453
TIA/EIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION/ELECTRONIC INDUSTRIES ALLIANCE www.tiaonline.org	(703) 907-7700
TPI	TRUSS PLATE INSTITUTE	(608) 833-5900
UL	UNDERWRITERS LABORATORIES INC. www.ul.com	(800) 704-4050 (847) 272-8800
WASTEC	WASTE EQUIPMENT TECHNOLOGY ASSOCIATION www.wastec.org	(800) 424-2869 (202) 244-4700
WCLIB	WEST COAST LUMBER INSPECTION BUREAU www.wclib.org	(800) 283-1486 (503) 639-0651
WCSC	WINDOW COVERING SAFETY COUNCIL (Formerly: WCMA - Window Covering Manufacturers Association) www.windowcoverings.org	(800) 506-4636 (212) 661-4261
WDMA	WINDOW & DOOR MANUFACTURERS ASSOCIATION (Formerly: NWWDA - National Wood Window and Door Association) www.wdma.com	(800) 223-2301 (847) 299-5200
WMMPA	WOOD MOULDING & MILLWORK PRODUCERS ASSOCIATION www.wmmpa.com	(800) 550-7889 (530) 661-9591
WWPA	WESTERN WOOD PRODUCTS ASSOCIATION www.wwpa.org	(503) 224-3930

2 CODE AGENCIES: Where abbreviations and acronyms are used in Specifications or other Contract Documents,
4 they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web-site
addresses are subject to change and are believed to be accurate and up-to-date as of the date of the Contract
Documents.

CABO	COUNCIL OF AMERICAN BUILDING OFFICIALS (See ICC)	
IAPMO	INTERNATIONAL ASSOCIATION OF PLUMBING AND MECHANICAL OFFICIALS	(909) 595-8449

www.iapmo.org

ICC INTERNATIONAL CODE COUNCIL, Inc. (703) 931-4533
(Formerly: CABO - Council of American Building Officials)
www.intlcode.org

2 FEDERAL GOVERNMENT AGENCIES: Where abbreviations and acronyms are used in Specifications or other
4 Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone
6 numbers, and Web-site addresses are subject to change and are believed to be accurate and up-to-date as of the date
of the Contract Documents.

CE ARMY CORPS OF ENGINEERS
www.usace.army.mil

CPSC CONSUMER PRODUCT SAFETY COMMISSION (800) 638-2772
www.cpsc.gov (301) 504-0990

EPA ENVIRONMENTAL PROTECTION AGENCY (202) 260-2090
www.epa.gov

FAA FEDERAL AVIATION ADMINISTRATION (202) 366-4000
www.faa.gov

NIST NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (301) 975-6478
www.nist.gov

OSHA OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (800) 321-6742
www.osha.gov (202) 693-1999

USPS POSTAL SERVICE (202) 268-2000
www.usps.com

8 **PART 2 - PRODUCTS** (Not Used)

10 **PART 3 – EXECUTION** (Not Used)

12 **END OF SECTION 01 42 00**

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 requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Requirements:
 - 1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Pay sewer-service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Pay water-service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Pay electric-power-service use charges for electricity used by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

- A. Site Plan: Contractor shall prepare a site plan showing temporary facilities, utility hookups, staging areas, and parking areas for construction personnel, and submit it for owner and architect approval.
- B. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.
- C. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage.
 - 1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
 - 2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
 - 3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines.

1.6 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage Installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide concrete bases for supporting posts.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
 - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
 - 2. Conference room of sufficient size to accommodate meetings of 10 individuals. Provide electrical power service and 120-V ac duplex receptacles, with no fewer than one receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack and marker boards.
 - 3. Drinking water and private toilet.
 - 4. Coffee machine and supplies.
 - 5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
 - 6. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

PART 3 - EXECUTION**3.1 INSTALLATION, GENERAL**

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
 1. Install electric power service overhead unless otherwise indicated.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
 2. Install lighting for Project identification sign.
- I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
 1. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.
 - e. Architect's office.
 - f. Engineers' offices.
 - g. Owner's office.
 - h. Principal subcontractors' field and home offices.
 2. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.
- J. Electronic Communication Service: Provide a laptop or desktop computer in the primary field office adequate for use by Architect and Owner to access Project electronic documents and maintain electronic communications. Equip computer with not less than the following:

1. Full-size keyboard and mouse.
2. Network Connectivity: 10Mbps Ethernet minimum.
3. Operating System: Microsoft Windows.
4. Productivity Software:
 - a. Microsoft Office, including Word, Excel, and Outlook.
 - b. Adobe Reader or Bluebeam
5. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, and scanning, or separate units for each of these three functions.
6. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum 10 Mbps upload and 10 Mbps download speeds.
7. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing, and spam protection in a combined application.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas as indicated on Drawings.
 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
 1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
 2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 312000 "Earth Moving."
 3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
 4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 321216 "Asphalt Paving."
- D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- E. Parking: Provide temporary parking areas for construction personnel.
- F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 2. Remove snow and ice as required to minimize accumulations.
- G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
1. Identification Signs: Provide Project identification signs as indicated on Drawings.
 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 - a. Provide temporary, directional signs for construction personnel and visitors.
 3. Maintain and touchup signs so they are legible at all times.
- H. Waste Disposal Facilities: Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- J. Temporary Elevator Use: Section 142400 "Hydraulic Elevators," for temporary use of new elevators.
- K. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- L. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.
- 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION
- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
1. Comply with work restrictions specified in Section 011000 "Summary."
- C. 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 requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Storm water Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of storm water from heavy rains.

- E. 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.
- F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
 - a. Fence to have view blocking mechanism/accessory installed.
- G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- I. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
 - 1. Prohibit smoking in construction areas.
 - 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
 - 3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
 - 4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.
 - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 - 4. Remove standing water from decks.
 - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - 2. Keep interior spaces reasonably clean and protected from water damage.
 - 3. Periodically collect and remove waste containing cellulose or other organic matter.

4. Discard or replace water-damaged material.
 5. Do not install material that is wet.
 6. Discard, replace, or clean stored or installed material that begins to grow mold.
 7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 2. Use permanent HVAC system to control humidity.
 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record readings beginning at time of exposure and continuing daily for 48 hours. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.
- 3.6 OPERATION, TERMINATION, AND REMOVAL
- A. Maintenance: Maintain facilities in good operating condition until removal.
1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- B. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

- a. Develop and implement an indoor air quality management plan for construction and preoccupancy phase to meet or exceed all applicable recommended control measures of Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guidelines for Occupied Buildings under Construction, 2nd edition, 2007 ANSI/SMACNA 008-2008, Chapter 3.
- b. Protect absorptive materials stored onsite or damaged after installation.
- c. Do not operate permanently installed air-handling equipment during construction, unless MERV 8 filtration media is installed at each return air grille and return or transfer duct inlet opening such that there is no bypass around the filtration media.
- d. Prohibit the use of tobacco products inside the building and within 25 feet during construction.

END OF SECTION 015000

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 THIS SECTION INCLUDES the following administrative and procedural requirements:

- 8 Selection of products for use in Project;
- 8 product delivery, storage, and handling;
- 10 manufacturers' standard warranties on products;
- 10 special warranties;
- 12 product substitutions; and comparable products.

14 RELATED SECTIONS INCLUDE the following:

- 14 Division 1 Section "Alternates" for products selected under an alternate.
- 16 Division 1 Section "References" for applicable industry standards for products specified.
- 16 Division 1 Section "Closeout Procedures" for submitting warranties for contract closeout.
- 18 Divisions 2 through 16 Sections for specific requirements for warranties on products and installations specified to be warranted.

22 **DEFINITIONS**

24 **PRODUCTS:** Items purchased 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.

26 **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.

28 **NEW PRODUCTS:** Items that have not previously been incorporated into another project or facility, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.

32 **COMPARABLE PRODUCT:** Product that is demonstrated and approved through submittal process, or where indicated as a product substitution, 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.

36 **SUBSTITUTIONS:** Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

40 **BASIS-OF-DESIGN PRODUCT SPECIFICATION:** Where a specific manufacturer's product is named and accompanied by the words "basis of design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

44 **MANUFACTURER'S WARRANTY:** Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

48 **SPECIAL WARRANTY:** Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.

52 **SUBMITTALS**

54 **PRODUCT LIST:** Submit a list, in tabular form, showing specified products. Include generic names of products required. Include manufacturer's name and proprietary product names for each product.

56 **COORDINATE PRODUCT LIST** with Contractor's Construction Schedule and the Submittals Schedule.

58 **FORM:** Tabulate information for each product under the following column headings:

- 58 Specification Section number and title.
- 60 Generic name used in the Contract Documents.
- 60 Proprietary name, model number, and similar designations.
- 62 Manufacturer's name and address.
- 62 Supplier's name and address.
- 64 Installer's name and address.
- 64 Projected delivery date or time span of delivery period.
- 66 Identification of items that require early submittal approval for scheduled delivery date.

66 **INITIAL SUBMITTAL:** WITHIN THIRTY (30) DAYS after date of commencement of the Work, submit two (2) copies of initial product list. Include a written explanation for omissions of data and for

variations from Contract requirements. At Contractor's option, initial submittal may be limited to product selections and designations that must be established early in Contract period.

COMPLETED LIST: WITHIN SIXTY (60) DAYS after date of commencement of the Work, submit two (2) copies of completed product list. Include a written explanation for omissions of data and for variations from Contract requirements.

ARCHITECT OR OWNER'S ACTION: Architect or Owner may respond in writing to Contractor within fifteen (15) days of receipt of completed product list. Response will include a list of unacceptable product selections and a brief explanation of reasons for this action. Lack of response does not constitute a waiver of requirement that products comply with the Contract Documents.

SUBSTITUTION REQUESTS: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

SUBSTITUTION REQUEST FORM: Use CSI Form as included at end of this Section.

DOCUMENTATION: Show compliance with requirements for substitutions and the following, as applicable:

Statement indicating why specified material or product cannot be provided.

Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.

Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

Product Data, including drawings and descriptions of products and fabrication and installation procedures.

Samples, where applicable or requested.

List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.

Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.

Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.

Detailed comparison of Contractor's Construction Schedule using proposed substitution 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 lack of availability or delays in delivery.

Cost information, including a proposal of change, if any, in the Contract Sum.

Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.

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.

ARCHITECT OR OWNER'S ACTION: If necessary, Architect or Owner will request additional information or documentation for evaluation within one week of receipt of a request for substitution. Contractor will be notified of acceptance or rejection of proposed substitution within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.

FORM OF ACCEPTANCE: Change Order.

USE PRODUCT SPECIFIED if Architect or Owner cannot make a decision on use of a proposed substitution within time allocated.

BASIS-OF-DESIGN PRODUCT SPECIFICATION SUBMITTAL: Comply with requirements in Division 1 Section "Submittal Procedures." Show compliance with requirements.

QUALITY ASSURANCE

COMPATIBILITY OF OPTIONS: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.

PRODUCT DELIVERY, STORAGE, AND HANDLING

DELIVER, STORE, AND HANDLE PRODUCTS using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions.

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.
- 4 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.
- 6 Inspect products on delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
- 8 Store products to allow for inspection and measurement of quantity or counting of units.
- 10 Store materials in a manner that will not endanger Project structure.
- 12 Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
- 14 Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
- 16 Protect stored products from damage.

18 STORAGE: Provide a secure location and enclosure at Project site for storage of materials and equipment. Coordinate location with Owner.

20 **PRODUCT WARRANTIES**

22 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.

26 SPECIAL WARRANTIES: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final execution.

- 28 Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
- 30 Specified Form: Forms are included with the Specifications. Prepare a written document using appropriate form properly executed.
- 32 Refer to Divisions 2 through 16 Sections for specific content requirements and particular requirements for submitting special warranties.

34 SUBMITTAL TIME: Comply with requirements in Division 1 Section "Closeout Procedures."

36 **PART 2 - PRODUCTS**

38 **PRODUCT OPTIONS**

40 PROVIDE PRODUCTS THAT COMPLY with the Contract Documents, that are undamaged, and unless otherwise indicated, that are new at time of installation.

42 PROVIDE PRODUCTS COMPLETE with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

44 STANDARD PRODUCTS: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.

48 OWNER RESERVES THE RIGHT to limit selection to products with warranties not in conflict with requirements of the Contract Documents.

50 WHERE PRODUCTS ARE ACCOMPANIED BY THE TERM "as selected," Architect will make selection. Where products are accompanied by the term "match sample," sample to be matched is Architect's.

52 DESCRIPTIVE, PERFORMANCE, AND REFERENCE STANDARD REQUIREMENTS in the Specifications establish "salient characteristics" of products.

54 OR EQUAL: Where products are specified by name and accompanied by the term "or equal" or "or approved equal" or "or approved," comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.

58 PRODUCT SELECTION PROCEDURES: Procedures for product selection include the following:

60 SINGLE NAMED PRODUCT: Where the Drawings or Specifications name a single product and/or manufacturer, provide the product named, unless a substitution has been approved.

62 SINGLE MANUFACTURER/SOURCE: Where Specification paragraphs or subparagraphs titled "Manufacturer" or "Source" name single manufacturers or sources, provide a product by the manufacturer or from the source named that complies with requirements.

66 MULTIPLE NAMED PRODUCTS: Where Specification paragraphs or subparagraphs titled "Products" introduce a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.

MULTIPLE MANUFACTURERS: Where Specification paragraphs or subparagraphs titled "Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.

AVAILABLE PRODUCTS: Where Specification paragraphs or subparagraphs titled "Available Products" introduce a list of names of both products and manufacturers, provide one of the products listed or another product that complies with requirements.

AVAILABLE MANUFACTURERS: Where Specification paragraphs or subparagraphs titled "Available Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements.

PRODUCT OPTIONS: Where Specification paragraphs titled "Product Options" indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by another manufacturer with equivalent size, profiles, and dimensional requirements.

BASIS-OF-DESIGN PRODUCTS: Where Specification paragraphs or subparagraphs titled "Basis-of-Design Product[s]" are included and also introduce or refer to a list of manufacturers' names, provide either the specified 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.

SUBSTITUTIONS MAY BE CONSIDERED at the option of the Architect, except when indicated on either the Drawings or Specifications as "no substitutions" or "no equal(s)".

VISUAL MATCHING SPECIFICATION: Where Specifications require matching an established Sample, select a product (and manufacturer) that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches satisfactorily. If no product available within specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents on "substitutions" for selection of a matching product.

VISUAL SELECTION SPECIFICATION: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, textures" or a similar phrase, select a product (and manufacturer) that complies with other specified requirements.

STANDARD RANGE: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.

FULL RANGE: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.

ALLOWANCES: Refer to individual Specification Sections and "Allowance" provisions in Division 1 (if applicable) for allowances that control product selection and for procedures required for processing such selections.

PRODUCT SUBSTITUTIONS

TIMING: Architect will consider requests for substitution if received within THIRTY (30) DAYS after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.

SUBSTITUTION 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:

- Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
- Requested substitution does not require extensive revisions to the Contract Documents.
- Requested substitution is consistent with the Contract Documents and will produce indicated results.
- Substitution request is fully documented and properly submitted.
- Requested substitution will not adversely affect Contractor's Construction Schedule.
- Requested substitution has received necessary approvals of authorities having jurisdiction.
- Requested substitution is compatible with other portions of the Work.
- Requested substitution has been coordinated with other portions of the Work.
- Requested substitution provides specified warranty.
- 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.

2 COMPARABLE PRODUCTS: Where products or manufacturers are specified by name, submit the following, in
3 addition to other required submittals, to obtain approval of an unnamed product:

4 Evidence that the proposed product does not require extensive revisions to the Contract Documents, that it
5 is consistent with the Contract Documents and will produce the indicated results, and that it is
6 compatible with other portions of the Work.

7 Detailed comparison of significant qualities of proposed product with those named in the Specifications.
8 Significant qualities include attributes such as performance, weight, size, durability, visual effect,
9 and specific features and requirements indicated.

10 Evidence that proposed product provides specified warranty.

11 List of similar installations for completed projects with project names and addresses and names and
12 addresses of architects and owners, if requested.

13 Samples, if requested.

14 **PART 3 - EXECUTION** (Not Used)

16 **END OF SECTION 01 60 00**

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and other Division-1 Sections of the Specifications, apply to this Section.

6 THIS SECTION INCLUDES general procedural requirements governing execution of the Work including, but not
limited to, the following:

- 8 Construction layout
- Field engineering and surveying
- 10 General installation of products
- Progress cleaning
- 12 Starting and adjusting
- Protection of installed construction
- 14 Correction of the Work

16 RELATED SECTIONS include the following:

- Division 1 Section "Project Management and Coordination" for procedures for coordinating field
18 engineering with other construction activities.
- Division 1 Section "Submittal Procedures" for submitting surveys.
- 20 Division 1 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary
for the installation or performance of other components of the Work.

22 CERTIFICATES: Submit certificate signed by land surveyor certifying that location and elevation of improvements
24 comply with requirements.

26 **QUALITY ASSURANCE**

28 SURVEYOR QUALIFICATIONS: A professional land surveyor legally qualified to practice in jurisdiction where
30 Project is located and who is experienced in providing land-surveying services of the kind indicated.

32 **PART 2 - PRODUCTS** (Not Used)

34 **PART 3 - EXECUTION**

36 **EXAMINATION**

38 EXISTING CONDITIONS: The existence and location of site improvements, utilities, and other construction
40 indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of
mechanical and electrical systems and other construction affecting the Work. Before construction, verify the
42 location and points of connection of utility services.

44 EXISTING UTILITIES: 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
46 underground utilities and other construction affecting the Work.

48 BEFORE CONSTRUCTION, VERIFY the location and invert elevation at points of connection of sanitary
sewer, storm sewer, and water-service piping; and underground electrical services.

50 FURNISH LOCATION DATA for work related to Project that must be performed by public utilities
serving Project site.

52 ACCEPTANCE OF CONDITIONS: Examine substrates, areas, and conditions, with Installer or Applicator present
where indicated, for compliance with requirements for installation tolerances and other conditions affecting
54 performance. Record observations.

56 WHERE A WRITTEN REPORT listing conditions detrimental to performance of the Work is required by other
Sections, include the following:

- 58 Description of the Work.
- List of detrimental conditions, including substrates.
- 60 List of unacceptable installation tolerances.
- Recommended corrections.

62 VERIFY COMPATIBILITY with and suitability of substrates, including compatibility with existing finishes or
64 primers.

2 EXAMINE ROUGHING-IN FOR MECHANICAL AND ELECTRICAL SYSTEMS to verify actual locations of
connections before equipment and fixture installation.

4 EXAMINE walls, floors, and roofs for suitable conditions where products and systems are to be installed.

6 PROCEED WITH INSTALLATION ONLY AFTER unsatisfactory conditions have been corrected. Proceeding
with the Work indicates acceptance of surfaces and conditions.

10 PREPARATION

12 EXISTING UTILITY INFORMATION: Furnish information to the local utility necessary to adjust, move, or
relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected
14 by construction. Coordinate with authorities having jurisdiction.

16 EXISTING UTILITY INTERRUPTIONS: Do not interrupt existing unless permitted under the following conditions
and then only after arranging to provide temporary utility services according to requirements indicated:

18 Notify Owner not less than TWO (2) days in advance of proposed utility interruptions.

20 Do not proceed with utility interruptions without Owner's written permission.

22 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
24 construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to
avoid delaying the Work.

26 VERIFY SPACE REQUIREMENTS and dimensions of items shown diagrammatically on Drawings.

28 CONSTRUCTION LAYOUT

30 VERIFICATION: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation
32 to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

34 ENGAGE A LAND SURVEYOR to lay out the Work using accepted surveying practices:

36 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.

38 ESTABLISH DIMENSIONS within tolerances indicated. Do not scale Drawings to obtain required
dimensions.

40 INFORM INSTALLERS of lines and levels to which they must comply.

CHECK THE LOCATION, LEVEL AND PLUMB, of every major element as the Work progresses.

42 NOTIFY ARCHITECT when deviations from required lines and levels exceed allowable tolerances.

CLOSE SITE SURVEYS with an error of closure equal to or less than the standard established by
44 authorities having jurisdiction.

46 LOCATE AND LAY OUT SITE IMPROVEMENTS, including pavements, grading, fill and topsoil placement,
utility slopes, and invert elevations.

48 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
50 markings and elevations for use with control lines and levels. Level foundations and piers from two or more
locations.

52 RECORD LOG: Maintain a log of layout control work. Record deviations from required lines and levels. Include
54 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 Owner.

58 FIELD ENGINEERING

60 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.

62 Do not change or relocate existing benchmarks or control points without prior written approval of Architect or
Owner. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate
64 permanent benchmarks or control points to Architect or Owner before proceeding. Replace lost or destroyed
permanent benchmarks and control points promptly. Base replacements on the original survey control points.

66 BENCHMARKS: Establish and maintain a minimum of TWO (2) permanent benchmarks on Project Site,
68 referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size
of benchmark. Record benchmark locations, with horizontal and vertical data, on Project Record Documents. Where
70 the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to

2 locate the Work. Remove temporary reference points when no longer needed. Restore marked construction to its
4 original condition.

6 INSTALLATION

8 LOCATE THE WORK AND COMPONENTS of the Work accurately, in correct alignment and elevation, as
10 indicated.

12 INSTALL vertical work plumb and make horizontal work level.

14 WHERE SPACE IS LIMITED, install components to maximize space available for maintenance and ease
16 of removal for replacement.

18 Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

20 Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.

22 COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS AND RECOMMENDATIONS for installing
24 products in applications indicated.

26 INSTALL PRODUCTS at the time and under conditions that will ensure the best possible results. Maintain
28 conditions required for product performance until Substantial Completion.

30 CONDUCT CONSTRUCTION OPERATIONS so no part of the Work is subjected to damaging operations or
32 loading in excess of that expected during normal conditions of occupancy.

34 TOOLS AND EQUIPMENT: Do not use tools or equipment that produce harmful noise levels.

36 ANCHORS AND FASTENERS: Provide anchors and fasteners as required to anchor each component securely in
38 place, accurately located and aligned with other portions of the Work.

40 MOUNTING HEIGHTS: where mounting heights are not indicated, mount components at heights directed by
42 architect.

44 ALLOW FOR BUILDING MOVEMENT, including thermal expansion and contraction.

46 JOINTS: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for
48 the best visual effect. Fit exposed connections together to form hairline joints.

50 HAZARDOUS MATERIALS: Use products, cleaners, and installation materials that are not considered hazardous.

52 CONSTRUCT CHASES AND PROVIDE OPENINGS to facilitate installation of equipment and systems indicated.

54 PROGRESS CLEANING

56 CLEAN PROJECT SITE AND WORK AREAS DAILY, including common areas. Coordinate progress cleaning for
58 joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials
60 lawfully.

62 COMPLY WITH REQUIREMENTS IN NFPA 241 for removal of combustible waste materials and debris.
64 DO NOT HOLD MATERIALS MORE THAN 7 DAYS during normal weather or 3 days if the
66 temperature is expected to rise above 80 deg F.

68 CONTAINERIZE HAZARDOUS AND UNSANITARY WASTE MATERIALS separately from other
waste. Mark containers appropriately and dispose of legally, according to regulations.

MAINTAIN PROJECT SITE free of waste materials and debris.

CLEAN AREAS WHERE WORK IS IN PROGRESS to the level of cleanliness necessary for proper execution of
the Work. Remove liquid spills promptly. Where dust would impair proper execution of the Work, broom-clean or
vacuum the entire work area, as appropriate.

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.

CONCEALED SPACES: Remove debris from concealed spaces before enclosing the space.

EXPOSED SURFACES: Clean exposed surfaces and protect as necessary to ensure freedom from damage and
deterioration at time of Substantial Completion.

2 CUTTING AND PATCHING: Clean areas and spaces where cutting and patching are performed. Completely
4 remove paint, mortar, oils, putty, and similar materials. Thoroughly clean piping, conduit, and similar features
6 before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

8 BURYING OR BURNING WASTE MATERIALS on-site will not be permitted. Washing waste materials down
10 sewers or into waterways will not be permitted.

12 CLEAN AND PROTECT CONSTRUCTION IN PROGRESS and adjoining materials already in place during
14 handling and installation. Apply protective covering where required to ensure protection from damage or
deterioration at Substantial Completion.

16 CLEAN AND PROVIDE MAINTENANCE on completed construction as frequently as necessary through the
18 remainder of the construction period. Adjust and lubricate operable components to ensure operability without
damaging effects.

20 LIMITING EXPOSURES: Supervise construction operations to assure that no part of the construction, completed or
22 in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction
24 period.

26 STARTING AND ADJUSTING

28 START EQUIPMENT AND OPERATING COMPONENTS to confirm proper operation. Remove malfunctioning
30 units, replace with new units, and retest.

32 ADJUST OPERATING COMPONENTS for proper operation without binding. Adjust equipment for proper
34 operation.

36 TEST EACH PIECE OF EQUIPMENT to verify proper operation. Test and adjust controls and safeties. Replace
38 damaged and malfunctioning controls and equipment.

40 MANUFACTURER'S FIELD SERVICE: If a factory-authorized service representative is required to inspect field-
42 assembled components and equipment installation, comply with qualification requirements in Division 1 Section
44 "Quality Requirements."

46 PROTECTION OF INSTALLED CONSTRUCTION

48 PROVIDE FINAL PROTECTION AND MAINTAIN CONDITIONS that ensure installed Work is without damage
50 or deterioration at time of Substantial Completion.

52 COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS for temperature and relative humidity.

54 CORRECTION OF THE WORK

56 REPAIR OR REMOVE AND REPLACE defective construction. Restore damaged substrates and finishes. Comply
with requirements in Division 1 Section "Cutting and Patching." Repairing includes replacing defective parts,
refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.

RESTORE PERMANENT FACILITIES used during construction to their specified condition.

REMOVE AND REPLACE DAMAGED SURFACES that are exposed to view if surfaces cannot be repaired
without visible evidence of repair. Repair components that do not operate properly. Remove and replace operating
components that cannot be repaired. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 01 73 00

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and other Division-1 Sections of the Specifications, apply to this Section.

6 THIS SECTION INCLUDES procedural requirements for cutting and patching.

8 PERFORM CUTTING AND PATCHING for coordination of the Work, to uncover Work for access or inspection,
10 to obtain samples for testing, to permit alterations to be performed, or for other similar purposes.

12 REFER to other Sections for specific requirements and limitations applicable to cutting and patching individual
parts of the Work.

14 MECHANICAL AND ELECTRICAL WORK: Requirements of this Section apply to mechanical and electrical
16 installations. Refer to applicable Specification Sections for additional requirements and limitations applicable to
cutting and patching of mechanical and electrical installations.

18 DEFINITIONS

20 CUTTING: Removal of existing construction necessary to permit installation or performance of other Work.

22 PATCHING: Fitting and repair work required to restore surfaces to original conditions after installation of other
24 Work.

26 "CUTTING AND PATCHING" DOES NOT INCLUDE work performed during the manufacturing of products. It
28 does not include the drilling of holes for installation of fasteners or similar operations. Demolition of selected
portions of the building for alterations is included in Division-2 Specification Sections.

30 SUBMITTALS:

32 CUTTING AND PATCHING PROPOSAL: Before cutting and patching the following categories of Work, submit a
34 proposal describing proposed procedures and obtain the Architect's approval to proceed:

- 36 Structural Steel
- 38 Miscellaneous structural metals, including lintels, equipment supports, stair systems and similar categories
of Work.
- 40 Structural concrete
- 42 Foundation systems
- Bearing and retaining walls
- Piping, ductwork, vessels and equipment.

44 SUBMIT PROPOSAL well in advance of the time cutting and patching will be performed and request approval to
proceed. Include the following information, as applicable, in the proposal:

- 46 DESCRIBE THE EXTENT of cutting and patching required and how it is to be performed; indicate why it
cannot be avoided;
- 48 DESCRIBE ANTICIPATED RESULTS in terms of changes to existing construction; include changes to
structural elements and operating components as well as changes in the building's appearance and
other significant visual elements;
- 50 LIST PRODUCTS TO BE USED and firms or entities that will perform Work,
Indicate Dates when cutting and patching is to be performed;
- 52 LIST UTILITIES that will be disturbed or affected, including those that will be relocated and those that
will be temporarily out-of-service. Indicate how long service will be disrupted.

56 QUALITY ASSURANCE

58 REQUIREMENTS FOR STRUCTURAL WORK: Do not cut and patch structural elements in a manner that would
reduce their load-carrying capacity or load-deflection ratio.

60 OPERATIONAL AND SAFETY LIMITATIONS: Do not cut and patch operating elements or safety related
62 components in a manner that would result in reducing their capacity to perform as intended, or result in increased
maintenance, or decreased operational life or safety.

64 VISUAL REQUIREMENTS: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a
66 manner that would, in the Architect's opinion, reduce the building's aesthetic qualities, or result in visual evidence of
cutting and patching. Remove and replace Work cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

USE MATERIALS that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

INSPECTION: Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

PREPARATION

PROVIDE TEMPORARY SUPPORT AND PROTECTION of Work to be cut. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

TAKE ALL PRECAUTIONS necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

PERFORMANCE

EMPLOY skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

CUT existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition. Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.

IN GENERAL, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Extent of cutting shall be minimized. Use core drills, power saws or other machines which will provide neat, minimum openings. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

CONCRETE & MASONRY CUTTING: Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.

COMPLY with requirements of applicable Sections of Division-2 where cutting and patching requires excavating and backfilling.

BY-PASS UTILITY SERVICES such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after bypassing and cutting.

PATCH with durable seams that are as invisible as possible. Comply with specified tolerances. Where feasible, inspect and test patched areas to demonstrate integrity of the installation. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

WHERE REMOVAL OF WALLS or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.

PAINTED SURFACES: Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken containing the patch, after the patched area has received primer and second coat.

THOROUGHLY CLEAN all areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 01 73 29

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 **SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT & DISPOSAL**

8 SUMMARY OF WORK: As a part of a “sustainable design initiative” for new building construction operations, this
10 Section includes administrative and procedural requirements for salvaging, recycling and disposing of non-
hazardous construction waste and debris.

12 RELATED SECTIONS:

14 DIVISION 01 SECTION "TEMPORARY FACILITIES AND CONTROLS" for waste containers at
Project site.

16 DIVISION 31 SECTION "SITE CLEARING" for disposition of waste resulting from site clearing.

18 DEFINITIONS

18 CONSTRUCTION WASTE: Building and site improvement materials and other solid waste resulting from
construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

20 DISPOSAL: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse,
or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

22 RECYCLE: Recovery of demolition or construction waste for subsequent processing in preparation for
reuse.

24 SALVAGE: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

26 SALVAGE AND REUSE: Recovery of demolition or construction waste and subsequent incorporation into
the Work.

28 PERFORMANCE GOALS: Develop a waste management plan that will salvage and recycle as much non-hazardous
construction waste as possible, including but not limited to the following:

30 CONSTRUCTION WASTE:

- 32 Site-clearing waste.
- Masonry and CMU
- Lumber
- 34 Wood sheet materials
- Wood trim
- 36 Metals
- Roofing
- 38 Insulation
- Gypsum board
- 40 Piping
- Electrical conduit

42 PACKAGING: salvage or recycle 100 percent of the following uncontaminated packaging materials:

- 44 Paper
- Cardboard
- Boxes
- 46 Plastic sheet and film
- Polystyrene packaging
- 48 Wood crates
- Plastic pails

52 SUBMITTALS

54 SUBMIT A WASTE MANAGEMENT PLAN within fifteen (15) days of date established for commencement of the
Work.

56 WASTE REDUCTION PROGRESS REPORTS: Concurrent with each Application for Payment, submit a current
58 status report, to include the following:

- 60 Material category.
- Generation point of waste.
- Total quantity of waste in tons.
- 62 Quantity of waste salvaged, both estimated and actual in tons.
- Quantity of waste recycled, both estimated and actual in tons.
- 64 Total quantity of waste recovered (salvaged plus recycled) in tons.
- Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- 66 Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and
organizations. Indicate whether organization is tax exempt.

2 Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and
organizations. Indicate whether organization is tax exempt.
4 Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by
recycling and processing facilities licensed to accept them. Include manifests, weight tickets,
6 receipts, and invoices.
8 Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and
incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and
invoices.

10 **QUALITY ASSURANCE**

12 **REGULATORY REQUIREMENTS:** Comply with hauling and disposal regulations of authorities having
jurisdiction.

14 **WASTE MANAGEMENT CONFERENCE:** Conduct a conference at the Project Site. Review methods and
16 procedures related to waste management.

18 **WASTE MANAGEMENT PLAN**

20 **DEVELOP A PLAN** consisting of waste identification, waste reduction work plan, and cost/revenue analysis.
22 Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.

24 **WASTE IDENTIFICATION:** Indicate anticipated types and quantities of site-clearing and construction
waste generated by the Work. Include estimated quantities and assumptions for estimates.

26 **WASTE REDUCTION WORK PLAN:** List each type of waste and whether it will be salvaged, recycled,
or disposed of in landfill or incinerator. Include points of waste generation, total quantity of each type of
28 waste, quantity for each means of recovery, and handling and transportation procedures.

30 Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project,
describe methods for preparing salvaged materials before incorporation into the Work.

32 Salvaged Materials for Sale: For materials that will be sold to individuals and organizations,
include list of their names, addresses, and telephone numbers.

34 Salvaged Materials for Donation: For materials that will be donated to individuals and
organizations, include list of their names, addresses, and telephone numbers.

36 Recycled Materials: Include list of local receivers and processors and type of recycled materials
each will accept. Include names, addresses, and telephone numbers.

38 Disposed Materials: Indicate how and where materials will be disposed of. Include name, address,
and telephone number of each landfill and incinerator facility.

40 Handling and Transportation Procedures: Include method that will be used for separating
recyclable waste including sizes of containers, container labeling, and designated location
42 on Project site where materials separation will be located.

44 **COST/REVENUE ANALYSIS:** Indicate total cost of waste disposal as if there was no waste management
plan and net additional cost or net savings resulting from implementing waste management plan. Include
46 the following:

Total quantity of waste.

48 Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection
containers for each type of waste.

50 Total cost of disposal (with no waste management).

52 Revenue from salvaged materials.

Revenue from recycled materials.

Savings in hauling and tipping fees by donating materials.

54 Savings in hauling and tipping fees that are avoided.

56 Handling and transportation costs. Include cost of collection containers for each type of waste.

Net additional cost or net savings from waste management plan.

PART 2 – PRODUCTS (not applicable)

58 **PART 3 – EXECUTION**

60 **PLAN IMPLEMENTATION**

62 **IMPLEMENT WASTE MANAGEMENT PLAN**, providing handling, containers, storage, signage, transportation,
and other items required during the entire duration of the Contract.

64 **COMPLY WITH DIVISION 01 SECTION "TEMPORARY FACILITIES AND CONTROLS"** for operation,
66 termination, and removal requirements.

2 TRAIN WORKERS, SUBCONTRACTORS, AND SUPPLIERS on proper waste management procedures, as
appropriate for the Work occurring at Project site.

4 DISTRIBUTE WASTE MANAGEMENT PLAN to all entities when they first begin work on-site. Review plan
procedures and locations established for salvage, recycling, and disposal.

6 SITE ACCESS AND TEMPORARY CONTROLS:

8 CONDUCT WASTE MANAGEMENT OPERATIONS to ensure minimum interference with roads, streets, walks,
walkways, and other adjacent occupied and used facilities.

12 DESIGNATE AND LABEL SPECIFIC AREAS ON PROJECT SITE necessary for separating materials that are to
be salvaged, recycled, reused, donated, and sold.

14 COMPLY WITH DIVISION 01 SECTION "TEMPORARY FACILITIES AND CONTROLS" for controlling dust
and dirt, environmental protection, and noise control.

18 **RECYCLING CONSTRUCTION WASTE**

20 Recycle paper and beverage containers used by on-site workers.

22 Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling
waste materials shall be shared equally by Owner and Contractor.

24 Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable
waste by type at Project site to the maximum extent practical.

26 Provide appropriately marked containers or bins for controlling recyclable waste until they are removed
from Project site. Include list of acceptable and unacceptable materials at each container and bin.

28 Inspect containers and bins for contamination and remove contaminated materials if found.

28 Stockpile processed materials on-site without intermixing with other materials. Place, grade, and shape
stockpiles to drain surface water. Cover to prevent windblown dust.

30 Stockpile materials away from construction area. Do not store within drip line of remaining trees.

32 Store components off the ground and protect from the weather.

Remove recyclable waste off Owner's property and transport to recycling receiver or processor.

34 **RECYCLING CONSTRUCTION WASTE**

Packaging:

36 Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.

38 Polystyrene Packaging: Separate and bag materials.

Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site.
For pallets that remain on-site, break down pallets into component wood pieces and
comply with requirements for recycling wood.

42 Crates: Break down crates into component wood pieces and comply with requirements for
recycling wood.

44 Site-Clearing Wastes: Chip brush, branches, and trees at landfill facility.

Wood Materials:

46 Clean Cut-Offs of Lumber: Grind or chip into small pieces.

Clean Sawdust: Bag sawdust that does not contain painted or treated wood.

Gypsum Board: Stack large clean pieces on wood pallets and store in a dry location.

48 Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill.
Screen out paper after grinding.

50 **DISPOSAL OF WASTE**

52 Except for items or materials to be salvaged, recycled, or otherwise reused, remove waste materials from
Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having
jurisdiction.

54 Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.

56 Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

Burning: Do not burn waste materials.

58 Disposal: Transport waste materials off Owner's property and legally dispose of them.

END OF SECTION 01 74 19

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 THIS SECTION INCLUDES administrative and procedural requirements for contract closeout, including, but not
limited to, the following:

- 8 Inspection procedures.
- Project Record Documents.
- 10 Operation and maintenance manuals.
- Warranties.
- 12 Instruction of Owner's personnel.
- Final cleaning

14 RELATED SECTIONS include the following:

- 16 Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial
and Final Completion.
- 18 Division 1 Section "Construction Progress Documentation" for submitting Final Completion construction
photographs and negatives.
- 20 Division 1 Section "Project Record Documents" for submitting Record Drawings, Record Specifications,
and Record Product Data.
- 22 Division 1 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
- 24 Divisions 2 through 49 Sections for specific closeout and special cleaning requirements for products of
those Sections.

SUBSTANTIAL COMPLETION

28 PRELIMINARY PROCEDURES: Before requesting inspection for determining date of Substantial Completion,
30 complete the following. List items below that are incomplete in request.

- 32 Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons
why the Work is not complete.
- Advise Owner of pending insurance changeover requirements.
- 34 Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and
utilities. Include occupancy permits, operating certificates, and similar releases.
- 36 Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of
changeover in security provisions.
- 38 Complete startup testing of systems.
- Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and
40 similar elements.
- Advise Owner of changeover in heat and other utilities.
- 42 Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

44 INSPECTION: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect
will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the
46 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.

- 48 Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is
completed or corrected.
- 50 Results of completed inspection will form the basis of requirements for Final Completion.

FINAL COMPLETION

54 PRELIMINARY PROCEDURES: Before requesting final inspection for determining date of Final Completion,
56 complete the following:

- 58 Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
- Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or
corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state
60 that each item has been completed or otherwise resolved for acceptance.
- Submit evidence of final, continuing insurance coverage complying with insurance requirements.
- 62 Submit pest-control final inspection report and warranty.
- Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and
64 similar documents.
- 66 Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion
construction photographs, damage or settlement surveys, property surveys, and similar final record
information.

2 Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with
3 manufacturer's name and model number where applicable.
4 Submit test/adjust/balance records.
5 Complete final cleaning requirements, including touchup painting.
6 Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
7 Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

8 INSPECTION: Submit a written request for final inspection for acceptance. On receipt of request, Architect will
9 either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final
10 Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected
11 before certificate will be issued. Request reinspection when the Work identified in previous inspections as
12 incomplete is completed or corrected.

14 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

16 PREPARATION: Submit three copies of list. Include name and identification of each space and area affected by
17 construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by
18 Contractor that are outside the limits of construction.

19 ORGANIZE LIST OF SPACES in sequential order, starting with exterior areas first.

20 ORGANIZE ITEMS APPLYING TO EACH SPACE by major element, including categories for ceiling,
21 individual walls, floors, equipment, and building systems.

22 INCLUDE THE FOLLOWING information at the top of each page:

23 Project name.

24 Date.

25 Name of Architect.

26 Name of Contractor.

27 Page number.

30 PROJECT RECORD DOCUMENTS

32 DO NOT USE PROJECT RECORD DOCUMENTS for construction purposes. Protect Project Record Documents
33 from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal
34 working hours.

36 RECORD DRAWINGS: Maintain and submit ONE (1) SET of blue- or black-line white prints of Contract
37 Drawings and Shop Drawings.

38 MARK RECORD PRINTS to show the actual installation where installation varies from that shown
39 originally. Require individual or entity who obtained record data, whether individual or entity is
40 Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

41 Give particular attention to information on concealed elements that cannot be readily
42 identified and recorded later.

43 Accurately record information in an understandable drawing technique.

44 Record data as soon as possible after obtaining it. Record and check the markup before
45 enclosing concealed installations.

46 Mark Contract Drawings or Shop Drawings, whichever is most capable of showing actual
47 physical conditions, completely and accurately. Where Shop Drawings are
48 marked, show cross-reference on Contract Drawings.

49 MARK WITH ERASABLE, RED-COLORED PENCIL. Use other colors to distinguish between changes
50 for different categories of the Work at the same location.

51 MARK IMPORTANT ADDITIONAL INFORMATION that was either shown schematically or omitted
52 from original Drawings.

53 NOTE Construction Change Directive numbers, Change Order numbers, alternate numbers, and similar
54 identification where applicable.

55 IDENTIFY AND DATE each Record Drawing; include the designation "PROJECT RECORD
56 DRAWING" in a prominent location. Organize into manageable sets; bind each set with durable
57 paper cover sheets. Include identification on cover sheets.

59 RECORD SPECIFICATIONS: Submit ONE (1) copy of Project's Specifications, including addenda and contract
60 modifications. Mark copy to indicate the actual product installation where installation varies from that indicated in
61 Specifications, addenda, and contract modifications.

62 GIVE PARTICULAR ATTENTION to information on concealed products and installations that cannot be
63 readily identified and recorded later.

64 MARK COPY with the proprietary name and model number of products, materials, and equipment
65 furnished, including substitutions and product options selected.

66 NOTE related Change Orders, Record Drawings, and Product Data, where applicable.

68 RECORD PRODUCT DATA: Submit one copy of each Product Data submittal. Mark one set to indicate the actual
69 product installation where installation varies substantially from that indicated in Product Data.

2 GIVE PARTICULAR ATTENTION to information on concealed products and installations that cannot be
3 readily identified and recorded later.
4 INCLUDE SIGNIFICANT CHANGES in the product delivered to Project site and changes in
5 manufacturer's written instructions for installation.
6 NOTE related Change Orders, Record Drawings, and Record Specifications, where applicable.

8 MISCELLANEOUS RECORD SUBMITTALS: Assemble miscellaneous records required by other Specification
9 Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind
10 or file miscellaneous records and identify each, ready for continued use and reference.

12 **ELECTRONIC PROJECT RECORD DOCUMENTS: Scan paper originals of Record Drawings, Record
13 Specifications, Record Product Data and miscellaneous Record Submittals to PDF files.**

14 **PROVIDE BOTH ELECTRONIC AND PRINTED Project Record Documents. Electronic version shall have Jewel
15 Case cover and disk identified to match printed copy. Provide on CD disk with data typically in PDF format.**

18 OPERATION AND MAINTENANCE MANUALS

20 ASSEMBLE A COMPLETE SET of operation and maintenance data indicating the operation and maintenance of
21 each system, subsystem, and piece of equipment not part of a system. Include operation and maintenance data
22 required in individual Specification Sections and as follows:

24 OPERATION DATA:

25 Emergency instructions and procedures.
26 System, subsystem, and equipment descriptions, including operating standards.
27 Operating procedures, including startup, shutdown, seasonal, and weekend operations.
28 Description of controls and sequence of operations.
29 Piping diagrams.

30 MAINTENANCE DATA:

31 Manufacturer's information, including list of spare parts.
32 Name, address, and telephone number of Installer or supplier.
33 Maintenance procedures.
34 Maintenance and service schedules for preventive and routine maintenance.
35 Maintenance record forms.
36 Sources of spare parts and maintenance materials.
37 Copies of maintenance service agreements.
38 Copies of warranties and bonds.

40 **PROVIDE BOTH ELECTRONIC AND PRINTED Operations and Maintenance Manuals. Electronic version shall
41 have Jewel Case cover and disk identified to match printed copy. Provide on CD disk with data typically in PDF
42 format.**

44 **ORGANIZE OPERATION AND MAINTENANCE MANUALS into suitable sets of manageable size. Bind and
45 index data in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents,
46 with pocket inside the covers to receive folded oversized sheets. Identify each binder on front and spine with the
47 printed title "OPERATION AND MAINTENANCE MANUAL," Project name, and subject matter of contents.**

50 WARRANTIES

52 **SUBMITTAL TIME: Submit written warranties on request of Architect for designated portions of the Work where
53 commencement of warranties other than date of Substantial Completion is indicated.**

56 **PARTIAL OCCUPANCY: Submit properly executed warranties within 15 days of completion of designated
57 portions of the Work that are completed and occupied or used by Owner during construction period by separate
58 agreement with Contractor.**

60 **ORGANIZE WARRANTY DOCUMENTS into an orderly sequence based on the table of contents of the Project
61 Manual.**

62 **BIND WARRANTIES AND BONDS in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as
63 necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (115-by-280-mm)
64 paper.**

66 **PROVIDE HEAVY PAPER DIVIDERS with plastic-covered tabs for each separate warranty. Mark tab to
67 identify the product or installation. Provide a typed description of the product or installation,
68 including the name of the product and the name, address, and telephone number of Installer.**

69 **IDENTIFY EACH BINDER on the front and spine with the typed or printed title "WARRANTIES,"
70 Project name, and name of Contractor.**

71 **PROVIDE ADDITIONAL COPIES OF EACH WARRANTY to include in operation and maintenance manuals.**

PART 2 - PRODUCTS

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MATERIALS

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.

PART 3 - EXECUTION

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FINAL CLEANING PROCEDURES:

EMPLOY EXPERIENCED WORKERS or professional cleaners for final cleaning. Clean each surface or unit of work to the condition expected from a normal, commercial building cleaning and maintenance program. Comply with the manufacturer's instructions for operations.

CLEAN TRANSPARENT MATERIALS, including mirrors and glass in doors and windows, to a polished condition. Remove putty and other substances which are noticeable as vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.

CLEAN EXPOSED EXTERIOR and interim hard-surfaced finishes to a dust-free condition, free of dust, stains, films and similar noticeable distracting substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces.

MECHANICAL AND ELECTRICAL EQUIPMENT shall be wiped clean. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.

CLEAN THE PROJECT SITE, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas to a broom clean condition; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface.

COMPLY WITH REGULATIONS of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

END OF SECTION 01 77 00

38

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.
 - 2. Operation manuals for systems, subsystems, and equipment.
 - 3. Product maintenance manuals.
 - 4. Systems and equipment 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. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed 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 operations and maintenance submittals are acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
- 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.

PART 2 - PRODUCTS**2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY**

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
 - 1. List of documents.
 - 2. List of systems.
 - 3. List of equipment.
 - 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. 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.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- 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."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: 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.
- D. 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: Enable bookmarking of 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.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.

2.3 OPERATION MANUALS

- A. 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.
- B. 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.
- C. 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.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.
- 2.4 PRODUCT MAINTENANCE MANUALS
- A. 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.
- B. 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.
- C. 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.
- D. 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.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. 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.
- 2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS
- A. 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 warranty and bond information, as described below.
- B. 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.

- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.
 - 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.
- D. 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.
- E. 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.
- F. 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.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. 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 3 - EXECUTION**3.1 MANUAL PREPARATION**

- 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. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 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.
- C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, 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.

1. 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.
- D. 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 operation and maintenance manuals.
 2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."
- E. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

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 017300 "Execution" for final property survey.
 2. Section 017700 "Closeout Procedures" for general closeout procedures.
 3. 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 PDF electronic files of scanned record prints and one of file prints.
 - 2) Submit record digital data files and one set(s) of plots.
 - 3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit three paper-copy set(s) of marked-up record prints.
 - 2) Submit PDF electronic files of scanned record prints and three set(s) of prints.
 - 3) Print each drawing, whether or not changes and additional information were recorded.
 - c. Final Submittal:
 - 1) Submit one paper-copy set(s) of marked-up record prints.
 - 2) Submit record digital data files and three set(s) of record digital data file plots.
 - 3) Plot each drawing file, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit one annotated PDF electronic files 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.

PART 2 - PRODUCTS**2.1 RECORD DRAWINGS**

- A. 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 archive 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 below first floor.
 - 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.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Annotated PDF electronic file.
 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 for resolution.
 4. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
 - a. See Section 013300 "Submittal Procedures" for requirements related to use of Architect's digital data files.
 - b. Architect will provide data file layer information. Record markups in separate layers.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file.
 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.
 - e. Name of Contractor.
 5. Leave one set of record documents on site, rolled up and secured inside a PVC tube with one sealed end and one screw on end that is water-tight, PVC tube shall be of sufficient size to allow easy extraction and re-insertion of record set of drawings. Locate drawing tube in a conspicuous location within the building's mechanical room.

2.2 RECORD SPECIFICATIONS

- A. 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. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.

4. Note related Change Orders and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file.

2.3 RECORD PRODUCT DATA

A. 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 and record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF electronic file.

1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 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 PDF electronic file.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

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 and Samples: Store record documents and Samples 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 reference during normal working hours.

END OF SECTION 017839

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and other Division-1 Sections of the Specifications, apply to this Section.

6 THIS SECTION INCLUDES administrative and procedural requirements for instructing the Owner's personnel,
including the following:

- 8 Demonstration of operation of systems, subsystems, and equipment.
- 9 Training in operation and maintenance of systems, subsystems, and equipment.
- 10 Preparation of DVD formatted videos of training program, for future employees of the Owner

12 **SUBMITTALS**

14 PROGRAM: Submit two (2) copies of outline of instructional program for demonstration and training, including a
16 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.

18 AT COMPLETION OF TRAINING, submit two (2) sets of the complete training manual for Owner's use.

20 DEMONSTRATION AND TRAINING DVD: Submit two (2) original DVD's of demonstration and training
22 program at completion of Work.

24 **QUALITY ASSURANCE**

26 FACILITATOR QUALIFICATIONS: A firm or individual experienced in training or educating maintenance
28 personnel in a training program similar in content and extent to that indicated for this Project, and whose work has
resulted in training or education with a record of successful learning performance.

30 INSTRUCTOR QUALIFICATIONS: A factory-authorized service representative, complying with requirements in
32 Division 1 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

34 **COORDINATION**

36 COORDINATE INSTRUCTION SCHEDULE with Owner's operations. Adjust schedule as required to minimize
38 disrupting Owner's operations. Coordinate instructors, including providing notification of dates, times, length of
instruction time, and course content.

40 COORDINATE CONTENT OF TRAINING MODULES with content of approved emergency, operation, and
42 maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed
and approved by the Owner.

46 **PART 2 - PRODUCTS**

48 **INSTRUCTION PROGRAM**

50 PROGRAM STRUCTURE: Develop an instruction program that includes individual training modules for each
system and equipment not part of a system, as required by individual Specification Sections, and as follows:

- 52 Motorized doors, including automatic entrance doors.
- 53 Equipment, including projection screens, food-service equipment, and residential appliances, as applicable
- 54 Fire-protection systems, including alarm and extinguishing systems
- 55 Security systems.
- 56 HVAC systems, including air-distribution systems, terminal equipment and devices, boilers, pumps,
chillers, cooling towers, condensers and piping systems.
- 57 HVAC instrumentation and controls.
- 58 Electrical service and distribution, including transformers, panelboards, and motor controls.
- 59 Sign and Lighting equipment and controls.
- 60 Communication systems, including phone and television systems

62 **TRAINING MODULES**

DEVELOP A LEARNING OBJECTIVE AND TEACHING OUTLINE for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:

DOCUMENTATION: Review the following items in detail:

- Emergency manuals.
- Operations manuals.
- Maintenance manuals.
- Maintenance service agreements and similar continuing commitments.

EMERGENCIES: Include the following, as applicable:

- Instructions on meaning of warnings, trouble indications, and error messages.
- Instructions on stopping.
- Shutdown instructions for each type of emergency.
- Operating instructions for conditions outside of normal operating limits.
- Sequences for electric or electronic systems.
- Special operating instructions and procedures.

OPERATIONS: Include the following, as applicable:

- Startup procedures.
- Equipment or system break-in procedures.
- Routine and normal operating instructions.
- Regulation and control procedures.
- Control sequences.
- Safety procedures.
- Instructions on stopping.
- Normal shutdown instructions.
- Operating procedures for emergencies.
- Operating procedures for system, subsystem, or equipment failure.
- Seasonal and weekend operating instructions.
- Required sequences for electric or electronic systems.
- Special operating instructions and procedures.

ADJUSTMENTS: Include the following:

- Alignments.
- Checking adjustments.
- Noise and vibration adjustments.
- Economy and efficiency adjustments.

TROUBLESHOOTING: Include the following:

- Diagnostic instructions.
- Test and inspection procedures.

MAINTENANCE: Include the following:

- Inspection procedures.
- Types of cleaning agents to be used and methods of cleaning.
- List of cleaning agents and methods of cleaning detrimental to product.
- Procedures for routine cleaning
- Procedures for preventive maintenance.
- Procedures for routine maintenance.
- Instruction on use of special tools.

REPAIRS: Include the following:

- Diagnosis instructions.
- Repair instructions.
- Disassembly; component removal, repair, and replacement; and reassembly instructions.
- Instructions for identifying parts and components.

PART 3 - EXECUTION

PREPARATION

ASSEMBLE EDUCATIONAL MATERIALS necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

SET UP INSTRUCTIONAL EQUIPMENT at instruction location.

INSTRUCTION

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6
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- FACILITATOR:** Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- ENGAGE QUALIFIED INSTRUCTORS** to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- SCHEDULING:** Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
Schedule training with Owner with at least seven days' advance notice.
- DEMONSTRATION AND TRAINING VIDEO:** Digitally record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
- CLEANUP:** Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

20 **END OF SECTION 01 79 00**

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions and Division - I Sections of the Specifications, apply to the Work of this Section.

6 WORK INCLUDED: Demolish and remove existing buildings, structures, and site improvements, as specified
herein. This Section includes the following:

- 8 Disconnecting, capping or sealing, and abandoning site utilities in place.
- Disconnecting, capping or sealing, and removing site utilities.
- 10 Excavating, backfilling, and site grading.

12 MATERIALS OWNERSHIP: Except for items or materials indicated to be reused, salvaged, or otherwise indicated
14 to remain the Owner's property, demolished materials shall become the Contractor's property and shall be removed
from the site with further disposition at the Contractor's option.

SUBMITTALS

18 SUBMIT A SCHEDULE of demolition activities indicating the following:
20 Detailed sequence of demolition and removal work, with starting and ending dates for each activity.
 Dates for shutoff, capping, and continuation of utility services.

QUALITY ASSURANCE

26 REGULATORY REQUIREMENTS: Comply with governing EPA notification regulations before starting
28 demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

PROJECT CONDITIONS

32 OWNER ASSUMES NO RESPONSIBILITY for actual condition of buildings to be demolished.

34 ASBESTOS: It is not expected that asbestos will be encountered in the course of this Contract. If any materials
36 suspected of containing asbestos are encountered, do not disturb the materials. Immediately notify the Architect and
the Owner.

38 STORAGE OR SALE OF REMOVED ITEMS or materials on-site will not be permitted without Architect or
40 Owners approval.

PART 2 - PRODUCTS**SOIL MATERIALS**

46 OBTAIN APPROVED BORROW soil materials off-site when sufficient satisfactory soil materials are not available
on-site.

48 SATISFACTORY SOIL MATERIALS (for import from other locations) shall be soil or soil-rock mixture free from
50 clay, rock or gravel larger than 2" in any dimension, debris, waste or frozen materials, vegetable and other
deleterious matter, and are further defined as those complying with ASTM D2487 groups GW, GP, GM, SM,
52 SW and SP.

54 UNSATISFACTORY SOIL MATERIALS (for import) are defined as those complying with ASTM D2487 groups
GC, SC, ML, MH, CL, CH, OL, OH and PT.

PART 3 - EXECUTION**EXAMINATION**

62 VERIFY THAT UTILITIES have been disconnected and capped.

64 SURVEY EXISTING CONDITIONS and correlate with requirements indicated to determine extent of demolition
required. Inventory and record the condition of items to be removed and reinstalled and items to be removed and
66 salvaged. Survey the condition of the building to determine whether removing any element might result in a

2 structural deficiency or unplanned collapse of any portion of the structure or adjacent structures during demolition.
3 Perform surveys as the Work progresses to detect hazards resulting from demolition activities.

4 **UTILITY SERVICES**

6 **MAINTAIN EXISTING UTILITIES** in service and protect them against damage during demolition operations.

8 **DO NOT INTERRUPT EXISTING UTILITIES** serving any other occupied or operating facilities. Provide
10 temporary services during interruptions to existing utilities, as acceptable to Owner and to governing authorities.

12 **UTILITY REQUIREMENTS:** Locate, identify, disconnect, and seal or cap off indicated utility services serving
14 structures to be demolished. Arrange to shut off indicated utilities with utility companies.

16 **PREPARATION**

18 **CONDUCT DEMOLITION OPERATIONS** and remove debris to ensure minimum interference with roads, streets,
20 walks, and other adjacent occupied and used facilities.

22 **DO NOT CLOSE OR OBSTRUCT** streets, walks, or other adjacent occupied or used facilities without permission
24 from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if
26 required by governing regulations.

28 **CONDUCT DEMOLITION OPERATIONS TO PREVENT INJURY** to people and damage to adjacent buildings
30 and facilities to remain. Ensure safe passage of people around demolition area.

32 Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where
34 required by authorities having jurisdiction.

36 Protect existing site improvements, appurtenances, and landscaping to remain.

38 Erect a plainly visible fence around drip line of individual trees or around perimeter drip line of groups of
40 trees to remain.

42 Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and
44 prevent movement, settlement, or collapse of buildings to be demolished and adjacent buildings to
46 remain.

48 Strengthen or add new supports when required during progress of demolition.

50 **EXPLOSIVES:** Use of explosives will not be permitted.

52 **POLLUTION CONTROLS**

54 **UTILIZE** water mist, temporary enclosures, and other suitable methods to limit the spread of dust and dirt. Comply
56 with governing environmental protection regulations.

58 **DO NOT CREATE HAZARDOUS** or objectionable conditions, such as ice, flooding, and pollution, when using
60 water.

62 **REMOVE AND TRANSPORT DEBRIS** in a manner that will prevent spillage on adjacent surfaces and areas.

64 **REMOVE DEBRIS FROM ELEVATED PORTIONS** of building by chute, hoist, or other device that will convey
66 debris to grade level.

68 **CLEAN ADJACENT BUILDINGS** and improvements of dust, dirt, and debris caused by demolition operations.
70 Return adjacent areas to condition existing before start of demolition.

DEMOLITION

DEMOLISH BUILDINGS completely and remove from the site. Use methods required to complete Work within
limitations of governing regulations and as follows:

LOCATE DEMOLITION EQUIPMENT throughout the building and remove debris and materials so as not to
impose excessive loads on supporting walls, floors, or framing.

DISPOSE OF DEMOLISHED ITEMS and materials promptly. On-site storage or sale of removed items is
prohibited without Architect, or Owners approval.

BELOW-GRADE DEMOLITION: Demolish foundation walls and other below-grade construction, as follows:

2 REMOVE BELOW GRADE CONSTRUCTION, including foundation walls, to at least 12 inches below grade.

4 BELOW GRADE CONCRETE SLABS: break up and remove unless otherwise indicated to remain. Break into sections no larger than 24 inches square and leave in place.

6 DAMAGES: Promptly repair damages to adjacent facilities caused by demolition operations.

8 BACKFILL & FILL:

10 FILLING BELOW-GRADE AREAS: Completely fill below-grade areas and voids resulting from demolition of
12 buildings and pavements with soil materials, in layers to provide minimum density (or range of percentage of
14 maximum density) specified below:

16 Provide fill in lifts not exceeding 9" loose thickness, until required subgrades are attained. Compact each layer to not
18 less than 95 % or more than 100 % of standard Proctor maximum dry density in accordance with ASTM D-698, with
moisture content between the range of optimum to + 3%.

20 DISPOSAL OF DEMOLISHED MATERIALS

22 PROMPTLY DISPOSE of demolished materials. Do not allow demolished materials to accumulate on-site.

24 DO NOT BURN demolished materials.

26 TRANSPORT DEMOLISHED MATERIALS off Owner's property and legally dispose of them.

28 **END OF SECTION 02 41 16**

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Form-facing material for cast-in-place concrete.
 2. Bracing and anchoring.

1.2 ACTION SUBMITTALS

- A. Product Data: For each of the following:
1. Concealed surface form-facing material.
 2. Form ties.
 3. Waterstops.
 4. Form-release agent.

1.3 INFORMATIONAL SUBMITTALS

- A. Field quality-control reports.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. As-Cast Surface Form-Facing Material:
1. Provide continuous, true, and smooth concrete surfaces.
 2. Furnish in largest practicable sizes to minimize number of joints.
 3. Acceptable Materials: As required to comply with Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete, and as follows:
 - a. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - 1) APA Structural 1 Plyform, B-B or better; mill oiled and edge sealed.
 - 2) APA Plyform Class I, B-B or better; mill oiled and edge sealed.
- B. Concealed Surface Form-Facing Material: Lumber, plywood, metal, plastic, or another approved material.
1. Provide lumber dressed on at least two edges and one side for tight fit.

2.2 WATERSTOPS

- A. Flexible Rubber Waterstops: U.S. Army Corps of Engineers CRD-C 513, [with factory-installed metal eyelets,] for embedding in concrete to prevent passage of fluids through joints, with factory fabricate corners, intersections, and directional changes.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Retain profile from options in "Profile" Subparagraph below. Insert others if required.

2. Profile: [Flat dumbbell with center bulb] [Flat dumbbell without center bulb] [Ribbed with center bulb] [Ribbed without center bulb] [As indicated] <Insert profile>.
3. Dimensions: [4 inches by 3/16 inch thick (100 mm by 4.8 mm thick)] [6 inches by 3/8 inch thick (150 mm by 10 mm thick)] [9 inches by 3/8 inch thick (225 mm by 10 mm thick)] <Insert dimensions>; nontapered.

- B. Flexible PVC Waterstops: U.S. Army Corps of Engineers CRD-C 572, [with factory-installed metal eyelets,] for embedding in concrete to prevent passage of fluids through joints, with factory fabricate corners, intersections, and directional changes.

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

Retain profile from options in "Profile" Subparagraph below. Insert others if required.

2. Profile: [Flat dumbbell with center bulb] [Flat dumbbell without center bulb] [Ribbed with center bulb] [Ribbed without center bulb] [As indicated] <Insert profile>.
3. Dimensions: [4 inches by 3/16 inch thick (100 mm by 4.8 mm thick)] [6 inches by 3/8 inch thick (150 mm by 10 mm thick)] [9 inches by 3/8 inch thick (225 mm by 10 mm thick)] <Insert dimensions>; nontapered.

- C. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch (19 by 25 mm).

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

- D. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer-modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch (10 by 19 mm).

1. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

2.3 RELATED MATERIALS

- A. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- C. 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.
2. Form release agent for form liners shall be acceptable to form liner manufacturer.

- D. 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.

PART 3 - EXECUTION

3.1 INSTALLATION OF FORMWORK

- A. Comply with ACI 301 (ACI 301M).
- B. Construct formwork, so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117 (ACI 117M) and to comply with the Surface Finish designations specified in Section 033000 "Cast-In-Place Concrete" for as-cast finishes.
- C. Limit concrete surface irregularities as follows:
 - 1. Surface Finish-2.0: ACI 117 Class B, 1/4 inch (6 mm).
- D. Construct forms tight enough to prevent loss of concrete mortar.
 - 1. Minimize joints.
 - 2. Exposed Concrete: Symmetrically align joints in forms.
- E. Construct removable forms for easy removal without hammering or prying against concrete surfaces.
 - 1. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces.
 - 2. Install keyways, reglets, recesses, and other accessories, for easy removal.
- F. Chamfer exterior corners and edges of permanently exposed concrete.
- G. At construction joints, overlap forms onto previously placed concrete not less than 12 inches (305 mm).
- H. Construction and Movement Joints:
 - 1. Construct joints true to line with faces perpendicular to surface plane of concrete.
 - 2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 3. Place joints perpendicular to main reinforcement.
 - 4. Space vertical joints in walls not less than 48 inches (1220 mm).
 - a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

- K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 INSTALLATION OF EMBEDDED ITEMS

- 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.
 - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
 - 3. 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.
 - 4. Clean embedded items immediately prior to concrete placement.

3.3 INSTALLATION OF WATERSTOPS

Retain "Flexible Waterstops" or "Self-Expanding Strip Waterstops" Paragraph below, depending on type of waterstop required.

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm.
 - 1. Install in longest lengths practicable.
 - 2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
 - 3. Allow clearance between waterstop and reinforcing steel of not less than 2 times the largest concrete aggregate size specified in Section 033000 "Cast-In-Place Concrete."
 - 4. Secure waterstops in correct position at 12 inches (305 mm) on center.

Retain first subparagraph below only if factory fabricated corners, intersections, and directional changes are not specified in PART 2.

- 5. Field fabricate joints in accordance with manufacturer's instructions using heat welding.
 - a. Miter corners, intersections, and directional changes in waterstops.
 - b. Align center bulbs.
 - 6. Clean waterstops immediately prior to placement of concrete.
 - 7. Support and protect exposed waterstops during progress of the Work.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated on Drawings, according to manufacturer's written instructions, by adhesive bonding, mechanically fastening, and firmly pressing into place.
 - 1. Install in longest lengths practicable.
 - 2. Locate waterstops in center of joint unless otherwise indicated on Drawings.
 - 3. Protect exposed waterstops during progress of the Work.

3.4 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. Inspect formwork for shape, location, and dimensions of the concrete member being formed.

END OF SECTION 03 10 00

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
1. Steel reinforcement bars.
 2. Welded-wire reinforcement.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
1. Each type of steel reinforcement.
 2. Bar supports.
- B. Shop Drawings: Comply with ACI SP-066:
1. Include placing drawings that detail fabrication, bending, and placement.
 2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, tie spacing, hoop spacing, and supports for concrete reinforcement.
- C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.
1. Location of construction joints is subject to approval of Architect.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Test Reports: For the following, from a qualified testing agency:
1. Steel Reinforcement:
 - a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.
- B. Field quality-control reports.
- C. Minutes of preinstallation conference.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420), deformed.
- B. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.2 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
 - 1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
- B. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch (1.2908 mm) in diameter.
 - 1. Finish: Plain.

2.3 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protection of In-Place Conditions:
 - 1. Do not cut or puncture vapor retarder.
 - 2. 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.

3.2 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement.

1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
 2. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than 1 inch (25 mm), not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318 (ACI 318M).
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
1. Bars indicated to be continuous, and all vertical bars to be lapped not less than 36 bar diameters at splices, or 24 inches (610 mm), whichever is greater.
 2. Stagger splices in accordance with ACI 318 (ACI 318M).
- G. Install welded-wire reinforcement in longest practicable lengths.
1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
 - a. For reinforcement less than W4.0 or D4.0, continuous support spacing to not exceed 12 inches (305 mm).
 2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches (50 mm) for plain wire and 8 inches (200 mm) for deformed wire.
 3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
 4. Lace overlaps with wire.

3.3 JOINTS

- A. 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.
 2. Continue reinforcement across construction joints unless otherwise indicated.

3.4 INSTALLATION TOLERANCES

- A. Comply with ACI 117 (ACI 117M).

3.5 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.

END OF SECTION 03 20 00

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 031000 "Concrete Forming and Accessories" for form-facing materials, form liners, insulating concrete forms, and waterstops.
2. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
3. Section 312000 "Earth Moving" for drainage fill under slabs-on-ground.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, and other pozzolans materials subject to compliance with requirements.

- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Aggregates.
4. Admixtures:

- a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.

5. Vapor retarders.
6. Curing materials.
7. Joint fillers.

- B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Maximum w/cm.
4. Slump limit.
5. Air content.
6. Nominal maximum aggregate size.
7. Intended placement method.
8. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - a. Location of construction joints is subject to approval of the Architect.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Vapor retarders.
5. Joint-filler strips.

B. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Aggregates.
4. Admixtures.

C. Research Reports: For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.

D. Preconstruction Test Reports: For each mix design.

E. Field quality-control reports.

F. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.
 - 1. Include the following information in each test report:
 - a. Admixture dosage rates.
 - b. Slump.
 - c. Air content.
 - d. Seven-day compressive strength.
 - e. 28-day compressive strength.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).

1.9 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 306.1.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M).

PART 2 - PRODUCTS**2.1 CONCRETE, GENERAL**

- A. ACI Publications: Comply with ACI 301 (ACI 301M) unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

- A. Cementitious Materials:
 - 1. Portland Cement: ASTM C150/C150M, Type I/II, gray.
 - 2. Fly Ash: ASTM C618, Class C or F.
- B. Normal-Weight Aggregates: ASTM C33/C33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Air-Entraining Admixture: ASTM C260/C260M.
- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride[in steel-reinforced concrete].

1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
 2. Retarding Admixture: ASTM C494/C494M, Type B.
 3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- E. Water and Water Used to Make Ice: ASTM C94/C94M, potable.

2.3 VAPOR BARRIER (UNDER SLAB-ON-GRADE):

10 mil thickness (minimum) meeting all requirements of ASTM E 1745 - Class A – with manufacturer’s product labeling indicating compliance:

“Vapor Block 10” by Raven Industries (800-342-5976),

“VaporCheck 10” by Viper (800-635-3456) or equivalent product of W.R Meadows (800-342-5976) or Fortifiber (800-732-6464), complete with manufacturer’s recommended 4” wide seaming tape and vapor-proofing mastic for joints and penetrations.

Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com with associated accessories including seam tape, mastic and pipe boots.

2.4 EVAPORATION RETARDER

Waterborne, monomolecular film forming, manufactured for application to fresh concrete. Acceptable products include:

Cimfilm; Axim Concrete Technologies.
Finishing Aid Concentrate; Burke Group, LLC (The).
Spray-Film; ChemMasters.
Aquafilm; Conspec Marketing & Manufacturing Co., Inc.
Sure Film; Dayton Superior Corporation.
Eucobar; Euclid Chemical Co.
Vapor Aid; Kaufman Products, Inc.
Lambco Skin; Lambert Corporation.
E-Con; L&M Construction Chemicals, Inc.
Confilm; Master Builders, Inc.
Waterhold; Metalcrete Industries.
Rich Film; Richmond Screw Anchor Co.
SikaFilm; Sika Corporation.
Finishing Aid; Symons Corporation.
Certi-Vex EnvioAssist; Vexcon Chemicals, Inc.

CURING & SEALING COMPOUND:

Clear, waterborne, membrane-forming compound meeting ASTM C 1315, Type-1, Class A. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

Burke: Cureseal 1315 WB
ChemMasters: Polyseal WB
Conspec: Sealcure 1315 WB.

Euclid Chemical: Super Diamond Clear VOX.
L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
Meadows: Vocomp-30.
Metalcrete: Metcure 30.
Symons: Cure & Seal 31 Percent E.
Tamms : LusterSeal WB 300.
Unitex: Hydro Seal 25.

CONCRETE SEALER:

PROVIDE concrete sealer finish at interior exposed concrete floor surfaces where indicated on the Drawings – and if not indicated, provide at all concrete slab surfaces not finished with other materials (unless noted otherwise).

CONCRETE SEALER: Clear, water soluble inorganic hardening, sealing and dustproofing material for treatment of uncovered concrete floor surfaces: Products that may be incorporated into the Work include, but are not limited to the following:

“Kure-N-Harden” by Degussa (800-433-9517 – email www.degussabuildingsystems.com),
“Durapoxy”, “H & C Silicone Acrylic Concrete Sealer” or approved equal products.

RELATED MATERIALS

STRIP-TOP EXPANSION JOINT FILLER: Preformed strips of Asphalt saturated fiberboard, complying with ASTM D-1751, with pre-cut or perforated, removable top edge for installation of sealant material.

EPOXY JOINT FILLER: Two-component, semirigid, 100 percent solids, epoxy resin with a Shore A hardness of 80 per ASTM D 2240.

BONDING AGENT: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

EPOXY-BONDING ADHESIVE: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements. Provide Type IV or Type V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

REGLETS: Fabricate reglets of not less than 0.0217 inch thick galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

REPAIR MATERIALS

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.
Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.

Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.

Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.

REPAIR TOPPING: Traffic-bearing, cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch minimum.

Cement Binder: ASTM C 150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

Primer: Product of topping manufacturer recommended for substrate, conditions, and application.

Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.

Compressive Strength: Not less than 5700 psi at 28 days when tested according to ASTM C 109/C 109M.

- A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A[, **except with maximum water-vapor permeance of] <Insert rating>**; not less than **10 mils** (0.25 mm) thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.

I. [<Double click here to find, evaluate, and insert list of manufacturers and products.>](#)

2.5 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
1. Color:
- Ambient Temperature Below 50 deg F (10 deg C): Black.
 - Ambient Temperature between 50 deg F (10 deg C) and 85 deg F (29 deg C): Any color.
 - Ambient Temperature Above 85 deg F (29 deg C): White.
- C. Water: Potable or complying with ASTM C1602/C1602M.
- D. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.

2.6 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.

2.7 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, in accordance with ACI 301 (ACI 301M).
1. Use a qualified 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 by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
- Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
 - Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.8 CONCRETE MIXTURES

- A. Normal-weight concrete used for footings, grade beams, foundation walls, and interior slabs-on-ground.

1. Minimum Compressive Strength: 4500 psi (31 MPa) at 28 days.
2. Maximum w/cm: 0.45.
3. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
4. Air Content:
 - a. Exposure Classes F2 and F3: 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch (25-mm) nominal maximum aggregate size.
 - b. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.

2.9 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 INSTALLATION OF EMBEDDED ITEMS

- 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.
 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
 3. 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.

3.2 INSTALLATION OF VAPOR RETARDER

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
 1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
 2. Face laps away from exposed direction of concrete pour.
 3. Lap vapor retarder over footings and grade beams not less than 6 inches (150 mm), sealing vapor retarder to concrete.
 4. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
 5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
 6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
 7. Protect vapor retarder during placement of reinforcement and concrete.
 - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches (150 mm) on all sides, and sealing to vapor retarder.

3.3 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
 - 1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.
 - 2. Place joints perpendicular to main reinforcement.
 - a. Continue reinforcement across construction joints unless otherwise indicated.
 - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
 - 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 not less than 48 inches (1220 mm). Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: 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 on Drawings.
 - 2. 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:
 - 1. Install dowel bars and support assemblies at joints where indicated on Drawings.
 - 2. Lubricate or asphalt coat one-half of dowel bar length to prevent concrete bonding to one side of joint.
- F. Dowel Plates: Install dowel plates at joints where indicated on Drawings.

3.4 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
 - 1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
 - 2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
 - 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.
 - 1. If a section cannot be placed continuously, provide construction joints as indicated.
 - 2. Deposit concrete to avoid segregation.
 - 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301 (ACI 301M).
 - a. Do not use vibrators to transport concrete inside forms.
 - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer.
 - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
 - d. 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. Do not place concrete floors and slabs in a checkerboard sequence.
 - 2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 3. Maintain reinforcement in position on chairs during concrete placement.
 - 4. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 5. Level concrete, cut high areas, and fill low areas.
 - 6. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
 - 7. Do not further disturb slab surfaces before starting finishing operations.

3.5 FINISHING FORMED SURFACES

- A. As-Cast Surface Finishes:
 - 1. ACI 301 (ACI 301M) Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
 - a. Patch voids larger than 3/4 inch (19 mm) wide or 1/2 inch (13 mm) deep.
 - b. Remove projections larger than 1/4 inch (6 mm).
 - c. Patch tie holes.
 - d. Surface Tolerance: ACI 117 (ACI 117M) Class B.
 - e. Locations: Apply to concrete surfaces exposed to public view.
- B. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.6 FINISHING FLOORS AND SLABS

- A. Comply with ACI 302.1R recommendations for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish:
 1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
 2. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 (ACI A117M) tolerances for conventional concrete.
 3. Apply float finish to surfaces to receive trowel finish.
- C. Trowel Finish:
 1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
 2. Continue troweling passes and restraighen until surface is free of trowel marks and uniform in texture and appearance.
 3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
 4. Do not add water to concrete surface.
 5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
 6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 7. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch (3 mm).

3.7 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

- A. Filling In:
 1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
 2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
 3. 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.

3.8 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.

1. Comply with ACI 301 (ACI 301M) and ACI 306.1 for cold weather protection during curing.
 2. Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.
- B. Curing Formed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:
1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
 2. If forms remain during curing period, moist cure after loosening forms.
 3. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
 - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
 - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
 - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
 - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
 - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
 - 2) Maintain continuity of coating and repair damage during curing period.
- C. Curing Unformed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:
1. Begin curing immediately after finishing concrete.
 2. Interior Concrete Floors:
 - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12 inches (300 mm).
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 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 (300 mm), and sealed by waterproof tape or adhesive.
 - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - b) Cure for not less than seven days.
 - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.

3.9 TOLERANCES

- A. Conform to ACI 117 (ACI 117M).

3.10 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
1. Testing agency to be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
 2. Testing agency to immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
 3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
 - a. Test reports to include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
 - 1) Project name.
 - 2) Name of testing agency.
 - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
 - 4) Name of concrete manufacturer.
 - 5) Date and time of inspection, sampling, and field testing.
 - 6) Date and time of concrete placement.
 - 7) Location in Work of concrete represented by samples.
 - 8) Date and time sample was obtained.
 - 9) Truck and batch ticket numbers.
 - 10) Design compressive strength at 28 days.
 - 11) Concrete mixture designation, proportions, and materials.
 - 12) Field test results.
 - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
 - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- C. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- D. Inspections:
1. Headed bolts and studs.
 2. Verification of use of required design mixture.
 3. Concrete placement, including conveying and depositing.
 4. Curing procedures and maintenance of curing temperature.
- E. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing to be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C143/C143M:
 - a. 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.
 - b. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete.
 - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C1064/C1064M:
 - a. One test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
5. Compression Test Specimens: ASTM C31/C31M:
 - a. Cast and laboratory cure two sets of three 6-inch (150 mm) by 12-inch (300 mm) or 4-inch (100 mm) by 8-inch (200 mm) cylinder specimens for each composite sample.
 - b. Cast, initial cure, and field cure two sets of two standard cylinder specimens for each composite sample.
6. Compressive-Strength Tests: ASTM C39/C39M.
 - a. Test one set of three laboratory-cured specimens at seven days and one set of two specimens at 28 days.
 - b. Test one set of two field-cured specimens at seven days and one set of two specimens at 28 days.
 - c. A compressive-strength test to be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor to evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. 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 (3.4 MPa) if specified compressive strength is 5000 psi (34.5 MPa), or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi (34.5 MPa).
9. 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.
10. Additional Tests:

- a. Testing and inspecting agency to 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.
 - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
 - 1) Acceptance criteria for concrete strength to be in accordance with ACI 301 (ACI 301M), Section 1.6.6.3.
11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 12. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

3.11 PROTECTION**A. Protect concrete surfaces as follows:**

1. Protect from petroleum stains.
2. Diaper hydraulic equipment used over concrete surfaces.
3. Prohibit vehicles from interior concrete slabs.
4. Prohibit use of pipe-cutting machinery over concrete surfaces.
5. Prohibit placement of steel items on concrete surfaces.
6. Prohibit use of acids or acidic detergents over concrete surfaces.

END OF SECTION 03 30 00

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 PROVIDE UNIT MASONRY where indicated on the drawings and as specified herein. This Section includes, but is
not limited to:

8 Concrete masonry units (CMU's).
Decorative CMU's
10 Face brick.
Mortar and grout.
12 Reinforcing steel.
Masonry joint reinforcement.
14 Ties and anchors.
Embedded thru-wall flashing.
16 Miscellaneous masonry accessories.

18 PRODUCTS INSTALLED, BUT NOT FURNISHED, under this Section include the following:

20 Cast-stone trim, furnished under Division 4 Section "Cast Stone."
Steel lintels and shelf angles for unit masonry, furnished under Division 5 Section "Metal Fabrications."

REFERENCES

22 ACI 530/ASCE 5/TMS 402-99: Building Code Requirements for Masonry Structures.
24 ACI 530.1/ASCE 6/TMS 602-99: Specifications for Masonry Structures.
ASTM A153/A153M-98: Standard Specification for Zinc Coating (Hot Dip) on Iron and Steel Hardware.
26 ASTM A580/A580M-98: Standard Specification for Stainless Steel Wire.
ASTM C144-99: Standard Specification for Aggregate for Masonry Mortar.
28 ASTM C150-98: Standard Specification for Portland Cement.
ASTM C207-97: Standard Specification for Hydrated Lime for Masonry Purposes.
30 ASTM C270-99: Standard Specification for Mortar for Unit Masonry.
International Masonry Institute All-Weather Council: Recommended Practices and Guide Specifications
32 for Cold Weather Masonry Construction.

SUBMITTALS

34 PRODUCT DATA: For each different masonry unit, accessory, and other manufactured product specified.

36 SHOP DRAWINGS: Show fabrication and installation details for the following:

38 REINFORCING STEEL: Detail bending and placement of unit masonry reinforcing bars. Comply with
40 ACI 315, "Details and Detailing of Concrete Reinforcement."
MASONRY TRIM: Indicate profiles of custom-fabricated trim units

MATERIAL SAMPLES FOR PRODUCT VERIFICATION:

42 FULL-SIZE UNITS of each different exposed masonry unit required, showing the full range of exposed
44 colors, textures, and dimensions to be expected in the completed construction.
46 CUSTOM BRICK SHAPES required for the Project
WEEP HOLES/VENTS in color to match mortar color.
48 ACCESSORIES EMBEDDED in the masonry

50 LIST OF MOCKUP MATERIALS: List generic product names together with manufacturers, manufacturers' product
names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify
52 materials used. Include mix proportions for mortar and grout and source of aggregates. Submittal is for information
only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract
54 Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.

56 MATERIAL CERTIFICATES: Signed by manufacturers certifying that each of the following items complies with
requirements, for each type of masonry unit required. Include size-variation data for brick, verifying that actual
58 range of sizes falls within specified tolerances. Include test data, measurements, and calculations establishing net-
area compressive strength of concrete masonry units:

60 EACH CEMENT PRODUCT required for mortar and grout, including name of manufacturer, brand, type,
and weight slips at time of delivery.
62 EACH COMBINATION OF MASONRY UNIT TYPE AND MORTAR type. Include statement of net-
area compressive strength of masonry units, mortar type, and net-area compressive strength of masonry
64 determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
REINFORCING BARS: Each material and grade required.
66 JOINT REINFORCEMENT: Each type and size of joint required.
ANCHORS, TIES AND METAL ACCESSORIES: Each type and size of units required.
68

ADVERSE-WEATHER PROCEDURES: Detailed description of methods, materials, and equipment to be used to comply with either cold- or hot-weather requirements.

QUALITY ASSURANCE

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, through one source from a single manufacturer for each product required.

SOURCE LIMITATIONS FOR MORTAR MATERIALS: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

PRECONSTRUCTION TESTING: Provide the services of a qualified independent testing agency to perform preconstruction testing indicated below as a part of the Work of this Section.

Concrete Masonry Unit Test: For each concrete masonry unit indicated, per ASTM C 140.

Mortar Test: For mortar properties per ASTM C 270.

Grout Test: For compressive strength per ASTM C 1019.

FIRE-RESISTANCE RATINGS: Where indicated, provide materials and construction identical to those of assemblies with fire-resistance ratings determined per ASTM E 119 by a testing and inspecting agency, by equivalent concrete masonry thickness, or by another means, as acceptable to authorities having jurisdiction.

PREINSTALLATION CONFERENCE: Conduct conference at Project site to comply with requirements in Division I Section "Project Meetings."

MOCKUP:

PROVIDE MASONRY MATERIALS for construction of a field mockup of each different exposed masonry material and color indicated, showing the full range of exposed colors, textures, and dimensions to be expected in the completed construction. Materials include but are not limited to:

MASONRY UNITS of each different exposed masonry unit

WEEP HOLES/VENTS

ACCESSORIES EMBEDDED in the masonry

BEFORE INSTALLING UNIT MASONRY, build mockup to verify selections made under sample Submittals and to demonstrate aesthetic effects. Refer to Division-I Section Quality Requirements for general requirements of Mockup. Clean exposed faces of mockup panels with masonry cleaner indicated.

DELIVERY, STORAGE, AND HANDLING

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.

PROTECT CONCRETE MASONRY UNITS from moisture absorption so that, at the time of installation, the moisture content is not more than the maximum allowed at the time of delivery.

STORE CEMENTITIOUS MATERIALS on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

DELIVER PREBLENDED, DRY MORTAR MIX in moisture-resistant containers designed for lifting and emptying into dispensing silo. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in a metal dispensing silo with weatherproof cover.

STORE MASONRY ACCESSORIES, including metal items, to prevent corrosion and accumulation of dirt and oil.

PROJECT CONDITIONS

WEATHER PROTECTION: 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. Extend cover a minimum of 24 inches down both sides and hold cover securely in place. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.

2 **DO NOT APPLY UNIFORM FLOOR OR ROOF LOADS for at least 12 hours and concentrated loads for at least 3**
3 **days after building masonry walls or columns.**

4 PREVENT GROUT, MORTAR, AND SOIL FROM STAINING the face of masonry to be left exposed or painted.
5 Immediately remove grout, mortar, and soil that come in contact with such masonry. Protect base of walls from rain-
6 splashed mud and from mortar splatter by coverings spread on ground and over wall surface. Protect sills, ledges,
7 and projections from mortar droppings. Protect surfaces of window and door frames, as well as similar products with
8 painted and integral finishes, from mortar droppings. Turn scaffold boards near the wall on edge at the end of each
9 day to prevent rain from splashing mortar and dirt onto completed masonry.

10 COLD-WEATHER REQUIREMENTS: Do not use frozen materials or materials mixed or coated with ice or frost.
11 Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions.
12 Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602. Use liquid
13 cleaning methods only when air temperature is 40 deg F and above and will remain so until masonry has dried, but
14 not less than 7 days after completing cleaning.

15 HOT-WEATHER REQUIREMENTS: Protect unit masonry work when temperature and humidity conditions
16 produce excessive evaporation of water from mortar and grout. Provide artificial shade and wind breaks and use
17 cooled materials as required. When ambient temperature exceeds 100 deg F, or 90 deg F with a wind velocity
18 greater than 8 mph, do not spread mortar beds more than 48 inches ahead of masonry. Set masonry units within one
19 minute of spreading mortar.

24 PART 2 - PRODUCTS

25 CONCRETE MASONRY UNITS (CMU): Normal weight, (unless otherwise indicated) ASTM C 90 open-ended
26 per allowable shrinkage rate of C-90 paragraph 5.2, with minimum average net-area compressive strength of 1900
27 PSI; face size: 8 inches nominal - 7-5/8 inches actual height x 16" nominal - 15-5/8 inch actual width, in total
28 nominal wall thickness as indicated in the Drawings. Provide manufacturer's standard light-gray colored units with
29 "smooth" (not textured) exposed face surface suitable for painting typically, and, provide textured-face units made
30 with gap-graded aggregates where units are indicated to receive a direct application of plaster or similar material.

31 PROVIDE SPECIAL SHAPED CMU'S at lintels, corners, jambs, sash, control joints, headers, bonding, and other
32 similar conditions.

33 **PROVIDE BULLNOSE CORNER CMU'S at all exposed outside corners, unless otherwise indicated.**

34 PRECAST CMU LINTELS OR BOND BEAMS: Provide either prefabricated concrete lintels or built-in
35 place masonry lintels using bond beam shapes with reinforcing bars indicated and filled with coarse grout.
36 Fabricate from concrete matching CMU color, texture, joint pattern and compressive strength, and with
37 reinforcing bars as required. Cure precast lintels by same method used for the concrete masonry units.

44 DECORATIVE CONCRETE MASONRY UNITS:

45 SPLIT-FACED AND SMOOTH-FACED CMU'S: ASTM C-90 or ASTM C-145 Grade N, 8" high x 16" wide units
46 with integral water-repellent admixture, in thickness as indicated on the Drawings. Provide finished face and
47 finished corner end units, chamfered top units with finished top face, and exterior corner units with finished ends, as
48 applicable.

49 SCORED FACES: Provide 8" x 8" scored faces, where indicated on the Drawings.

50 COLOR: Provide units with integral color as selected by Architect from manufacturer's full range of color
51 options.

52 STONE MASONRY UNITS: High-density pre-finished calcium-silicate masonry units conforming to ASTM C90-
53 96. Provide units with integral water-repellent admixture, and with special shapes and special sizes at archways,
54 bands and where indicated in the Drawings.

55 "Renaissance" units as manufactured by "Arriscraft International" (www.arriscraft.com) or approved equal
56 in size, series, surface finish/texture and color as indicated on the Drawings

57 STONE MASONRY UNITS: High-density pre-finished concrete masonry units conforming to ASTM C90-96.
58 Provide units with special shapes and special sizes at archways, bands and where indicated in the Drawings:

59 "Prairie Stone" as manufactured by "Northfield Block Company" (www.trenwyth.com) or approved equal,
60 in size, product series, surface finish/texture and color as indicated on the Drawings.

61 STONE MASONRY TRIM UNITS (Contractor's option for "Cast Stone" trim unless noted otherwise): High-
62 density pre-finished concrete masonry trim-units conforming to ASTM C90-96, typically fabricated with integral-
63 cut drip-edge on bottom surface and with sloped surfaces where exposed, in special profile shapes as indicated in the

Drawings for “Cast Stone”. Provide shop-drawings of special-shapes or product-data submittals for standard shaped products. Provide units manufactured by the following, or approved equal only:

“Prairie Stone” as manufactured by “Northfield Block Company (www.trenwyth.com) or approved equal, 48 inch nominal length (for typical units), with smooth, “groundface” surface finish/texture, in “Limestone” color typically unless otherwise indicated on the Drawings. Provide matching corner trim as applicable

GLAZED CONCRETE MASONRY UNITS: Lightweight or medium weight units per ASTM C90 with an integral water-repellent admixture, with a smooth, satin-gloss, externally heat-polymerized, cast-on facing conforming with ASTM C 744:

Astra-Glaze SW units as manufactured by Trenwyth Industries, or approved equal, in color(s) as indicated on the Drawings

FACE BRICK:

PROVIDE BRICK per ASTM C 216, Grade SW, Type FBX, FBS, FBA, with initial rate of absorption less than 30 g/30 sq. In. per minute when tested per ASTM C 67, “not effloresced” when tested per ASTM C-79, and with no observable surface coloring difference in applied finish when viewed from 10 feet after 50-cycles of freezing and thawing per ASTM C-67 (except for flashed or sand-finished units).

MODULAR UNIT SIZE: Provide units manufactured to actual dimensions of 3-1/2 to 3-5/8 inches wide x 2-1/4 high by 7-1/2 to 7-5/8 inches long, except when indicated otherwise.

MANUFACTURER/PRODUCT COLOR & TEXTURE: Provide brick as indicated in the Drawings. Do not substitute materials without approval of the Architect.

PROVIDE SPECIAL BRICK SHAPES where standard units cannot be modified by saw-cutting un-exposed portions of the brick do not expose saw-cut surfaces). At sills or caps, provide uncured or unfroged units with all exposed surfaces finished. Provide special shapes at lintels, corners, jambs, sash, control joints, headers, bonding, and other special conditions. Provide square-edged units at outside corners, except where indicated as bullnose.

LIPPED BRICK UNITS: Provide manufactured “soldier” or “stretcher” lipped units at shelf angles as appropriate – field cut units are not acceptable

MORTAR AND GROUT MATERIALS

PORTLAND CEMENT-LIME MIX: Provide pre-packaged blend of natural or white Portland cement (as required to produce mortar color required), complying with ASTM C 150, Type I or Type II (except that Type III may be used for cold-weather construction), with hydrated lime complying with ASTM C 207, Type S. Masonry cement mixes are not acceptable.

PROVIDE INTEGRAL WATER-REPELLENT ADMIXTURE factory blended in mix complying with ASTM E-514 when tested as a wall assembly obtaining a Class E Rating, at all exterior masonry wall construction (including masonry veneers).

PRE-PACKAGED COLORED CEMENT: Provide pre-packaged Portland cement-lime mix containing pigments to produce color indicated, or if not indicated, as selected from manufacturer’s standard colors. Pigments shall not exceed 10 percent of Portland cement by weight.

AGGREGATE FOR MORTAR: ASTM C 144. For mortar exposed to view, use washed aggregate consisting of natural sand or crushed stone. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve. Provide natural white sand if necessary to produce required mortar color.

AGGREGATE FOR GROUT: ASTM C 404.

COLD-WEATHER ADMIXTURE: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494, Type C, and recommended by the manufacturer for use in masonry mortar of composition indicated Available products include:

Accelguard 80; Euclid Chemical Co.
Morseled; W. R. Grace & Co., Construction Products Division.
Trimix-NCA; Sonneborn, Div. of ChemRex, Inc.

WATER-REPELLENT ADMIXTURE: Liquid water-repellent mortar admixture intended for use with concrete masonry units, containing integral water repellent by same manufacturer. Available products include:

Mortar Tite; Addiment Inc.
Dry-Block Mortar Admixture; W. R. Grace & Co., Construction Products Division.
Rheopel Mortar Admixture, BASF/Master Builders.

2 WATER: Potable.

4 RELATED MASONRY MATERIALS:

6 MASONRY-CELL INSULATION: ASTM C-578 Type I, rigid, molded, expanded-polystyrene insulation units
8 specially shaped for installing in cores of masonry units: “Korfil” by Concrete Block Insulating Systems, “Omni
Core” by Shelter Enterprises Inc, or equal.

10 REINFORCING STEEL: Uncoated steel reinforcing bars: ASTM A 615/A 615M; ASTM A 616/A 616M, including
12 Supplement 1; or ASTM A 617/A 617M, Grade 60 (Grade 400).

14 JOINT REINFORCEMENT: ASTM A 951, hot-dip galvanized, carbon-steel wire for both interior and exterior
16 walls, with W2.8 or 0.188-inch diameter side-rods and W2.8 or 0.188-inch diameter cross-rods. Provide in lengths
18 of not less than 10 feet, with prefabricated corner and tee units. For single-wythe masonry, provide either ladder or
truss type with single pair of side rods and cross rods spaced not more than 16 inches o.c. At multi-wythe masonry,
provide ladder type with perpendicular cross rods spaced not more than 16 inches o.c. and 1 side rod for each face
shell of hollow masonry units more than 4 inches (in width, plus 1 side rod for each wythe of masonry 4 inches (or
less in width)).

20 TIES AND ANCHORS - GENERAL: ASTM A-82 hot-dip galvanized carbon-steel wire with ASTM A 153, Class
22 B-2 coating; ASTM A-653 steel sheet with G60 hot-dipped galvanized coating, and ASTM A-36 steel plates,
24 shapes, and bars with G60 hot-dipped galvanized coating.

26 BENT WIRE TIES: Rectangular units with closed ends and not less than 4 inches wide. Z-shaped ties with ends
28 bent 90 degrees to provide hooks not less than 2 inches long may be used for masonry constructed from solid units
or hollow units laid with cells horizontal. Fabricated from 3/16-inch- diameter, hot-dip galvanized steel wire.

30 ADJUSTABLE ANCHORS FOR CONNECTING TO STEEL FRAME: Two-piece assemblies that allow vertical or
horizontal adjustment but resist tension and compression forces perpendicular to plane of wall. Fabricate anchor
32 section of crimped 1/4-inch- diameter, hot-dip galvanized steel wire for welding to steel. Fabricate tie section of
triangular-shaped 0.1875-inch diameter hot-dip galvanized steel wire, sized to extend within 1 inch of masonry face.

34 ANCHORS FOR CONNECTING TO CONCRETE: Two-piece assemblies that allow vertical or horizontal
adjustment but resist tension and compression forces perpendicular to plane of wall. Fabricate dovetail anchor
36 section from 0.0966-inch- thick, steel sheet, galvanized after fabrication. Fabricate tie section from triangular-shaped
0.1875-inch- diameter, hot-dip galvanized steel wire, sized to extend within 1 inch of masonry face, made from.

38 ADJUSTABLE MASONRY-VENEER ANCHORS: Two-piece assemblies that allow vertical or horizontal
40 adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to
wood or metal studs, capable of withstanding a 100-lbf load in both tension and compression without deforming or
42 developing play in excess of 0.05 inch. Fabricate anchor section from rib-stiffened, 0.0677-inch thick sheet metal
plate galvanized after fabrication with screw holes top and bottom, 2-3/4 inches wide by 3 inches high; with
44 projecting tabs having slotted holes for inserting vertical legs of wire tie specially formed to fit anchor section..
Fabricate wire-tie section from triangular- shaped 0.1875-inch- diameter hot-dip galvanized steel wire tie sized to
46 extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Subject to compliance with
requirements, products that may be incorporated into the work include, but are not limited to, the following:

48 D/A 213; Dur-O-Wal, Inc.

D/A 210 with D/A 700-708; Dur-O-Wal, Inc.

50 315-D with 316; Heckman Building Products, Inc.

52 Pos-I-Tie; Heckman Building Products, Inc.

DW-10; Hohmann & Barnard, Inc.

DW-10HS; Hohmann & Barnard, Inc.

54 1004, Type III; Masonry Reinforcing Corporation of America.

RJ-711; Masonry Reinforcing Corporation of America.

56 STEEL DRILL SCREWS FOR STEEL STUDS: No 10 diameter minimum ASTM C 954 except manufactured with
58 hex washer head and with neoprene washer, length required to penetrate steel stud flange by not less than 3 exposed
60 threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B
117.

62 Dril-Flex; Elco Industries, Inc.

Hohmann & Barnard, Inc.

64 Traxx; ITW-Buildex.

66 ANCHOR BOLTS: Headed type steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts
and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153, Class C; of diameter and length
68 indicated.

70 THRU-WALL MASONRY FLASHING SYSTEM: Provide an fully integrated thru-wall masonry flashing system
throughout the project as manufactured by “Illinois Products Corporation” (IPCO), phone: 800-383-8183, website:

www.illinoisproducts.com or equivalent system as manufactured by “Polyguard Products Inc, phone: 800-541-4994, website: www.polyguardproducts.com, including the following components:

- Solvent based rubber flashing primer,
- 30-mil self-adhesive rubberized asphalt flashing composite
- Pre-formed flashing corners and end-dams
- 3/8” (exposed) x 0.015 x 1-5/8-inch deep sheet metal drip-edge
 - Stainless steel at light colored masonry, or
 - Copper sheet metal at dark colored masonry units
- Pre-formed inside and outside drip-edge corners
- 15 mil (28 gage) Type 304 stainless steel cavity bridges, and
- Rubberized asphalt flashing mastic, to seal edges of flashing

COMPRESSIBLE FILLER: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 50 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.

PREFORMED CONTROL-JOINT GASKETS: Material as indicated below, designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

- STYRENE-BUTADIENE-RUBBER COMPOUND: ASTM D 2000, Designation M2AA-805.
- PVC: ASTM D 2287, Type PVC-65406.

BOND-BREAKER STRIPS: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).

RECTANGULAR PLASTIC WEEP/VENTS: Clear butyrate or PVC, 3/8 by 1-1/2 by 3-1/2:
Cell Vent; Dur-O-Wal, Inc., or Hohmann & Barnard # 343 louvered Weep Vent or equal

CAVITY DRAINAGE MATERIAL: 1-inch- thick, free-draining mesh; made from polyethylene strands and shaped to avoid being clogged by mortar droppings.

- Mortar Break; by Advanced Building Products, Inc.
- Polytite MortarStop, by Dayton Superior Corporation, Dur-O-Wal Division
- Mortar Net; Mortar Net USA, Ltd.

REINFORCING BAR POSITIONERS: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.142-inch steel wire, hot-dip galvanized after fabrication. Provide units with either two loops or four loops as needed for number of bars indicated.

- D/A 811; Dur-O-Wal, Inc.
- D/A 816; Dur-O-Wal, Inc.
- No. 376 Rebar Positioner; Heckman Building Products, Inc.
- #RB Rebar Positioner; Hohmann & Barnard, Inc.
- #RB-Twin Rebar Positioner; Hohmann & Barnard, Inc.
- Double O-Ring Rebar Positioner; Masonry Reinforcing Corporation of America.
- O-Ring Rebar Positioner; Masonry Reinforcing Corporation of America.

MASONRY CLEANER: Provide 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 manufacturer of masonry units being cleaned.

MORTAR AND GROUT MIXES

DO NOT USE admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated. Do not use calcium chloride in mortar or grout.

ADD COLD-WEATHER ADMIXTURE (IF USED) at the same rate for all mortar, regardless of weather conditions, to ensure that mortar color is consistent.

PREBLENDED, DRY MORTAR MIX: Furnish dry mortar ingredients in the form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

MORTAR FOR UNIT MASONRY: Comply with ASTM C 270, Property Specification, and as follows:

- Typical Unit masonry or masonry veneer: Type N.
- For masonry below grade, in contact with earth, and where indicated, use Type M.
- For reinforced masonry and where specifically indicated, use Type S.

GROUT FOR UNIT MASONRY: Comply with ASTM C 476, and provide material with 2,000 PSI compressive strength when tested at 28 days, unless noted otherwise. Use grout of type indicated or, if not otherwise indicated, of

2 type (fine or coarse) that will comply with Table 5 of ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces
and pour height. Provide grout with a slump of 8 to 11 inches as measured according to ASTM C 143.

4 EPOXY POINTING MORTAR: Mix epoxy pointing mortar to comply with mortar manufacturer's directions.

6 PART 3 - EXECUTION

8 EXAMINATION

10 EXAMINE CONDITIONS, WITH INSTALLER PRESENT, for compliance with requirements for installation
12 tolerances and other conditions affecting performance. For the record, prepare written report, endorsed by Installer,
listing conditions detrimental to performance.

14 Verify that foundations are within tolerances specified.

14 Verify that reinforcing dowels are properly placed.

16 Proceed with installation only after unsatisfactory conditions have been corrected.

18 BEFORE INSTALLATION, EXAMINE rough-in and built-in construction to verify actual locations of piping
connections.

20 INSTALLATION, GENERAL

22 THICKNESS: Build cavity and composite walls and other masonry construction to the full thickness shown. Build
24 single-wythe walls to the actual widths of masonry units, using units of widths indicated.

26 BUILD CHASES AND RECESSES to accommodate items specified in this Section and in other Sections of the
28 Specifications.

30 LEAVE OPENINGS FOR EQUIPMENT TO BE INSTALLED before completing masonry. After installing
equipment, complete masonry to match the construction immediately adjacent to the opening.

32 CUT MASONRY UNITS with motor-driven saws to provide clean, sharp, unchipped edges. Cut units as required to
34 provide a continuous pattern and to fit adjoining construction. Where possible, use full-size units without cutting.
Allow units cut with water-cooled saws to dry before placing, unless wetting of units is specified. Install cut units
36 with cut surfaces and, where possible, cut edges concealed.

38 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.

40 **AT EXISTING MASONRY, match coursing, bonding, color, and texture of existing materials.**

42 WETTING OF BRICK: Wet brick before laying if the initial rate of absorption exceeds 30 g/30 sq. in. per minute
44 when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at the time of laying.

46 **INSTALL MASONRY-CELL INSULATION units into masonry unit cells before laying units.**

48 CONSTRUCTION TOLERANCES

50 COMPLY WITH ACI 530.1/ASCE 6/TMS 602 and the following:

52 FOR CONSPICUOUS VERTICAL LINES, such as external corners, door jambs, reveals, and expansion
54 and control joints, do not vary from plumb by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.

56 FOR VERTICAL ALIGNMENT OF EXPOSED HEAD JOINTS, do not vary from plumb by more than
1/4 inch in 10 feet, nor 1/2 inch maximum.

58 FOR CONSPICUOUS HORIZONTAL LINES, such as exposed lintels, sills, parapets, and reveals, do not
60 vary from level by more than 1/4 inch in 20 feet, nor 1/2 inch maximum.

62 FOR EXPOSED 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. Do not vary from bed-joint thickness of adjacent courses by
64 more than 1/8 inch.

66 FOR EXPOSED HEAD JOINTS, do not vary from thickness indicated by more than plus or minus 1/8
68 inch. Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.

LAYING MASONRY WALLS

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. Lay exposed masonry in "running bond" or as otherwise indicated in the Drawings. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.

STOPPING AND RESUMING WORK: In each course, rack back one-half-unit length for one-half running bond or one-third-unit length for one-third running bond; do not tooth. Clean exposed surfaces of set masonry, wet clay masonry units lightly if required, and remove loose masonry units and mortar before laying fresh masonry.

BUILT-IN WORK: As construction progresses, build in items specified under this and other Sections of the Specifications. Fill in solidly with masonry around built-in items.

FILL SPACE BETWEEN HOLLOW-METAL FRAMES and masonry solidly with grout, unless otherwise indicated.

WHERE BUILT-IN ITEMS ARE TO BE EMBEDDED in cores of hollow masonry units, place a layer of metal lath in the joint below and rod mortar or grout into core.

FILL CORES IN HOLLOW CMU's with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.

BUILD NON-LOAD-BEARING INTERIOR PARTITIONS full height of story to underside of solid floor or roof structure above, unless otherwise indicated. Install compressible filler in joint between top of partition and underside of structure above. At fire-rated partitions, install firestopping in joint between top of partition and underside of structure above to comply with Division 7 Section "Firestopping."

MORTAR BEDDING

LAY HOLLOW MASONRY UNITS with full mortar coverage on horizontal and vertical face shells. Bed webs in mortar in starting course on footings and in all courses of piers, columns, and pilasters, and where adjacent to cells or cavities to be filled with grout. For starting course on footings where cells are not grouted, spread out full mortar bed, including areas under cells.

LAY SOLID BRICK-SIZE MASONRY UNITS 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.

SET CAST-STONE TRIM UNITS in full bed of mortar with full vertical joints (except as required for sealant joints noted below). Fill all dowel, anchor, and similar holes. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water. Wet joint surfaces thoroughly before applying mortar.

BOND WYTHES OF COMPOSITE MASONRY OR CAVITY WALLS together using masonry joint reinforcement installed in horizontal mortar joints at spacing not to exceed 16" OC vertically. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement with continuous horizontal wire in facing wythe attached to ties. At corners, provide prefabricated L-shaped units as well as interlocking masonry unit bonding in each wythe and course. Unless vertical expansion or control joints are required, bond intersection and abutting walls together with individual metal ties not more than 16 inches OC or with prefabricated T-shaped ladder-reinforcing units.

AT COMPOSITE MASONRY WALLS, provide solid-filled collar joints (in addition to masonry joint reinforcement) by parging the face of the first wythe that is laid and shoving units of the other wythe into place.

AT CAVITY WALLS, bevel beds away from cavity, to minimize mortar protrusions into cavity. As work progresses, trowel mortar fins protruding into cavity flat against the cavity face of the brick. Keep cavities clean of mortar droppings and other materials during construction. Provide temporary opening by omitting 1 brick every 48 inches at bottom of cavity and in first course above flashing. After wall has been built to top of cavity and mortar has set, clean out cavity and then close temporary opening.

JOINTING

TOOL EXPOSED MORTAR JOINTS SLIGHTLY CONCAVE when thumbprint hard, using a jointer larger than the joint thickness, unless otherwise indicated.

CUT JOINTS FLUSH FOR MASONRY WALLS to receive plaster or other direct-applied finishes (other than paint), unless otherwise indicated.

SEALANT JOINTS: Rake-back mortar 3/4 inch deep minimum, sponge clean, and provide sealant joints in accordance with Division-7 Section "Joint Sealers" at the following locations:

- Head joints of all horizontal surfaces on solid masonry copings
- Between all brick and CMU or cast-stone masonry units
- At horizontal surfaces of all projecting masonry units, including sills or running trims
- At all horizontal relieving angles
- At all masonry control-joints or building expansion joints

MASONRY JOINT REINFORCEMENT

PROVIDE CONTINUOUS MASONRY JOINT REINFORCEMENT by installing entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches. Space reinforcement not more than 16 inches o.c. typically, and at not more than 8 inches o.c. in foundation walls, free-standing enclosure walls, and parapet walls. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings, in addition to continuous reinforcement.

CUT OR INTERRUPT JOINT REINFORCEMENT at control and expansion joints, unless otherwise indicated. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

ANCHOR MASONRY TO STRUCTURAL MEMBERS where masonry abuts or faces structural members by providing an open space not less than 1/2 inch in width between masonry and structural member, unless otherwise indicated. Keep open space free of mortar and other rigid materials. Install anchors embedded in masonry joints and attached to structure. Space anchors not more than 24 inches o.c. vertically and 36 inches o.c. horizontally or more as indicated on the Drawings.

ANCHOR MASONRY VENEERS to wall framing with masonry-veneer anchors by fastening screw-attached anchors through sheathing to wall framing with a minimum of two (2) metal fasteners unless anchor design only uses one fastener. Apply sealant at all penetrations of anchors through sheathing material – either before or after anchor installation to maintain the air-moisture barrier at the sheathing face. Embed tie sections in masonry joints. Locate anchor sections to allow maximum vertical differential movement of ties up and down. Space anchors as indicated, but not more than 16 inches o.c. vertically and 24 inches o.c. horizontally. Install additional anchors within 12 inches of openings and at intervals, not exceeding 8 inches around perimeter.

CONTROL AND EXPANSION JOINTS

PROVIDE MASONRY CONTROL JOINTS where indicated on the Drawings, and as follows:

- Install control joints at spacing not to exceed 24 feet horizontally if not indicated on the drawings.
- Install control joints above both sides of lintels or shelf-angles when the open span exceeds six (6) feet in width.

EXPANSION JOINTS: Build-in related items as masonry progresses. Do not form a continuous span through movement joints unless provisions are made to prevent in-plane restraint of wall or partition movement.

FORM CMU CONTROL JOINTS by (1) fitting bond-breaker strips into hollow contour at ends of units on one side of control joint, filling resultant core with grout, and raking joints in the exposed faces., or (2) by using control-joint gaskets designed to fit standard sash block, or (3) by installing special shaped interlocking units designed specifically for control joints. Install bond-breaker strips at all control joints. Keep head joints free and clear of mortar or rake out joint for application of sealant. Install temporary foam-plastic filler in head joints and remove filler when unit masonry is complete.

FORM CONTROL JOINTS IN BRICK by forming open joint of not less than 3/8 inch for installation of sealant and backer rod specified in Division 7 Section "Joint Sealants." Keep joint free and clear of mortar.

CONSTRUCT HORIZONTAL, PRESSURE-RELIEVING JOINTS by inserting a compressible filler of 3/8-inch high minimum for installing sealant and backer rod specified in Division 7 Section "Joint Sealants." Locate horizontal, pressure-relieving joints beneath all shelf angles supporting masonry veneer and attached to structure behind masonry veneer.

LINTELS

INSTALL STEEL LINTELS IN UNIT AND BRICK MASONRY if precast lintel or other structural support is not indicated on the Drawings and opening is greater than 12 inches.

PROVIDE PRECAST LINTELS IN CMU WALLS except where steel lintels or other structural support is indicated on the Drawings and opening is greater than 24 inches. Temporarily support built-in-place lintels until cured.

2 PROVIDE MINIMUM BEARING of 8 inches at each jamb, unless otherwise indicated.

4 FLASHING, WEEPS AND CAVITY DRAINAGE

6 INSTALL EMBEDDED FLASHING AND WEEP HOLES in masonry at shelf angles, lintels, ledges, other
8 obstructions to downward flow of water in wall, and where indicated.

10 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.
12 Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by
14 flashing manufacturer.

16 AT MULTIWYTHE MASONRY WALLS, including cavity walls, extend flashing through outer wythe, turned up a
minimum of 8 inches, and through inner wythe to within 1/2 inch of the interior face of wall in exposed masonry.
Where interior face of wall is to receive furring or framing, carry flashing completely through inner wythe and turn
18 flashing up approximately 2 inches on interior face.

20 AT MASONRY-VENEER WALLS, extend flashing through veneer, across air space behind veneer, and up face of
sheathing at least 8 inches; with upper edge tucked under building paper or building wrap, or behind exterior
22 sheathing board when building paper does not exist, lapping flashings at least 4 inches.

24 INSTALL SELF-ADHERING FLASHING SYSTEM in strict accordance with flashing system manufacturer's
installation instructions and recommendations. Install metal drip edges beneath flexible flashing at exterior face of
26 wall. Stop flexible flashing 1 inch back from outside face of wall and adhere flexible flashing to top of metal drip
edge. Install cavity-bridge units to span any openings that would not support the flashing material. Place metal drip-
28 edge in a bead of urethane sealant, and apply flashing material to top of drip-edge starting 1 inch from outside edge
of masonry. Apply flashing material to the face of glass-mat gypsum sheathing panels with the flashing
30 manufacturer's primer, and extend up face of sheathing at least 8 inches. Seal top edge with manufacturer's flashing
mastic per manufacturer's recommendations.

32 AT LINTELS AND SHELF ANGLES, extend flashing a minimum of 6 inches into masonry at each end. At heads
34 and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.

36 INSTALL WEEP UNITS in the head joints in exterior wythes of the first course of masonry immediately above
embedded flashing, spaced at 24 inches o.c. Place cavity drainage material immediately above flashing in cavities at
38 each weep.

40 INSTALL CAVITY VENTS in the highest available head joint (excluding rowlocks) at the top of all cavity spaces
at same spacing as weep vents.

42 INSTALL REGLETS AND NAILERS for flashing and other related construction where they are shown to be built
44 into masonry.

46 REINFORCED UNIT MASONRY INSTALLATION

48 TEMPORARY FORMWORK AND SHORES: Construct formwork and shores to support reinforced masonry
elements during construction. Construct formwork to conform to shape, line, and dimensions shown. Make it
50 sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and
shape during construction and curing of reinforced masonry. Do not remove forms and shores until reinforced
52 masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be
54 placed on them during construction.

56 PLACING REINFORCEMENT: Comply with requirements of ACI 530.1/ASCE 6/TMS 602.

58 GROUTING: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist
grout pressure. Comply with requirements of ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement,
60 including minimum grout space and maximum pour height.

62 FIELD QUALITY CONTROL

64 A TESTING AGENCY will be engaged to perform field quality-control testing of installed Work. Costs for
retesting installed materials failing to meet specified requirements is a part of the Work of this Section.

68 FREQUENCY: Each 5000 SF of wall area or portion thereof maximum.

70 MORTAR PROPERTIES: ASTM C 780.

- 2 GROUT COMPRESSIVE STRENGTH: ASTM C 1019.
- 4 BRICK of each type and grade used: ASTM C 67.
- 6 CMU's of each type used: ASTM C 140.
- 8 MASONRY PRISIMS: For each type of wall construction indicated to be "Prism-Tested", prepare prisms
10 per ASTM C-1314 standards, 1 set for testing at 7 days, and a second set for testing at 28 days.
- 12 REPAIRING, POINTING, AND CLEANING
- 14 REMOVE AND REPLACE masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do
16 not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate
evidence of replacement.
- 18 POINTING: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with
20 mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform
appearance. Prepare joints for sealant application.
- 22 IN-PROGRESS CLEANING: Clean unit masonry as work progresses by dry brushing to remove mortar fins and
24 smears before tooling joints.
- 26 FINAL CLEANING:
- 28 AFTER MORTAR IS THOROUGHLY SET AND CURED, clean all exposed masonry. Remove large mortar
30 particles by hand with wooden paddles and nonmetallic scrape hoes or chisels. Test cleaning methods on sample
32 wall panel; leave one-half of panel uncleaned for comparison purposes. Protect adjacent surfaces from contact with
cleaner by covering with liquid strippable masking agent, polyethylene film, or waterproof masking tape. Wet wall
34 surfaces with water before applying cleaners; remove cleaners promptly by rinsing the surfaces thoroughly with
clear water.
- 36 CLEAN brick by the bucket-and-brush hand-cleaning method described in BIA Technical Notes No. 20, using job-
38 mixed detergent solution. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's
written instructions that is approved for use by the manufacturer of the masonry. Clean concrete masonry by
cleaning method indicated in NCMA TEK 8-2 applicable to type of stain on exposed surfaces.
- 40 REMOVE ALL EXCESS MASONRY from Project site.
- 42 **END OF SECTION 04 20 00**

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide cast stone as shown on the drawings, as specified herein, and as needed to meet the
8 requirements of the construction indicated in the Contract Documents. Types of applications include but are not
limited to the following:

10 **Running trim shapes**

RELATED SECTIONS

12 Division-4 Section: Unit Masonry Assemblies.

14 Division-7 Section: Joint Sealants.

REFERENCES

16 ACI 318 - Building Code Requirements for Reinforced Concrete.

18 ASTM A 185 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.

20 ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete
Reinforcement.

22 ASTM C 33 - Standard Specification for Concrete Aggregates.

24 ASTM C 150 - Standard Specification for Portland Cement.

26 ASTM C 270 - Standard Specification for Mortar for Unit Masonry.

28 ASTM C 494 - Standard Specification for Chemical Admixtures for Concrete.

30 ASTM C 642 - Standard Test Method for Specific Gravity, Absorption, and Voids in
Hardened Concrete.

32 ASTM C 979 - Standard Specification for Pigments for Integrally Colored Concrete.

34 ASTM C 1194 - Standard Test Method for Compressive Strength of Architectural Cast Stone.

36 ASTM C 1195 - Standard Test Method for Absorption of Architectural Cast Stone.

38 ASTM C 1364 - Architectural Cast Stone.

40 ASTM D 2244 - Standard Test Method for Calculation of Color Differences From Instrumentally
Measured Color Coordinates.

42 Cast Stone Institute Technical Manual.

DEFINITIONS

34 CAST STONE: Highly refined architectural concrete stone product manufactured to simulate fine grain texture of
36 natural stone.

40 VIBRANT DRY TAMP (VDT) CASTING METHOD: Vibratory ramming of damp, zero-slump concrete against
42 rigid formwork until it is densely compacted and ready for immediate removal from form.

SUBMITTALS

44 PRODUCT DATA: Test results of cast stone components made previously by manufacturer.

48 SUBMIT SHOP DRAWINGS to indicate sizes, profiles, setting mark, and locations of each cast stone item
50 required, with dimensioned plans, elevations, sections and large scale details., as applicable. Show arrangement of
52 joints, bonding, details of anchors, inserts, joints, connections to adjoining materials, reinforcing, and methods of
installation and anchoring. Indicate actual, verified in-place field dimensions of adjacent construction elements as
applicable.

54 PROVIDE MATERIAL CERTIFICATES for the following signed by cast stone manufacturer certifying that
materials comply with the following requirements:

56 COMPRESSIVE STRENGTH AND WATER ABSORPTION TESTS of cast stone materials. Test results
58 shall be determined by the average of three specimens per test. The results of compression tests
shall be divided by a factor of 0.8 when saw-cut or core-drilled specimens are used.

MATERIAL AND GRADE CERTIFICATES, for reinforcing bars and accessories.

QUALITY ASSURANCE

62 MANUFACTURER QUALIFICATIONS: A current producer member of Cast Stone Institute, with a minimum of 5
64 years of experience in producing cast stone of types required for project. Plant shall have adequate capacity to
66 furnish quality, sizes, and quantity of cast stone required without delaying progress of the Work. Products previously
produced by plant and exposed to weather shall exhibit satisfactory appearance.

68 STANDARDS: Comply with requirements of Cast Stone Institute Technical Manual.

DELIVERY, STORAGE, AND HANDLING

PACKING AND SHIPPING: Carefully load and pack all cast stone for transportation secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.

ACCEPTANCE AT SITE: Receive and unload cast stone utilizing competent workmen with necessary care and handling to avoid damage and soiling.

HANDLE cast stone and related materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, corrosion, breakage, chipping, or other causes. Do not use pinch or wrecking bars. Lift with wide-belt-type slings where possible; do not use wire rope or ropes containing tar or other substances that might cause staining. If required to move cast stone, use wood rollers with cushions at end of wood slides.

STORE cast stone on wood skids or pallets covered with nonstaining, waterproof membrane. Place and stack skids and stones to distribute weight evenly and to prevent breakage or cracking of stones. Protect stored stone from weather with waterproof, nonstaining covers or enclosures, but allow air to circulate around stones.

REPLACEMENTS: In the event of damage, immediately make all repairs and replacements necessary at no additional cost to the Owner.

SCHEDULE AND COORDINATE PRODUCTION AND DELIVERY of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the Work.

PART 2 - PRODUCTS**ARCHITECTURAL CAST STONE:**

Provide specific running trim and architectural units as indicated in the Drawings.

Comply with: ASTM C 1364.

Casting Method: Vibrant Dry Tamp.

Compressive Strength, ASTM C 1194: 6,500 psi minimum at 28 days.

Absorption, ASTM C 642 or C 1195: 6 percent maximum at 28 days.

Color and Finish: Provide up to 2 different colors on cast-stone products, with up to two (2) textures (rough and smooth – fine grained). Match sample on file at Architect's office.

Viewing Conditions: Compare in direct daylight at 10 feet, after subjecting to similar aging and weathering conditions.

Maximum Variation, ASTM D 2244: 2 percent hue; 6 percent lightness, chroma, and hue combined.

CAST STONE MATERIALS

Portland Cement: ASTM C 150, Type I, white or gray as required to match Architect's sample.

Coarse Aggregate: ASTM C 33, except for gradation; granite, quartz, or limestone.

Fine Aggregate: ASTM C 33, except for gradation; natural or manufactured sands.

Pigments: ASTM C 979, inorganic iron oxides.

Admixtures: ASTM C 494.

Water: Potable.

Reinforcing:

Bars: ASTM A 615/A 615M, galvanized or epoxy coated.

Mesh: ASTM A 185, galvanized or epoxy coated.

MORTAR MATERIALS: ASTM C 270, Type N.

ACCESSORIES

Anchors: Type 304 Stainless Steel, sized for conditions.

Sealant: As specified in Section 07 92 00.

CLEANER: Manufacturer's standard-strength, general-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces. Expressly approved for intended use by cast stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.

FABRICATION

SHAPES: Unless otherwise indicated on drawings, provide:

Suitable wash on exterior sills, copings, projecting courses, and components with exposed top surfaces.

Drips on projecting components, wherever possible.

Premolded corners where units wrap around corner elements. Do not field miter corners.

REINFORCEMENT: Provide reinforcement as required to withstand handling and structural stresses.

Comply with ACI 318.

Provide reinforcement of a minimum of 0.25 percent of cross-section area.

CURING: Cure cast stone components with a direct fired steam generator at a minimum temperature of 105 degrees F for a minimum of 6 hours, within 12 hours of fabrication. Cure cast stone components in presence of carbon monoxide and carbon dioxide to promote carbonation at surface, to minimize efflorescence.

FINISHING: Remove cement film from exposed surfaces before packaging for shipment.

TOLERANCES: Fabricate cast stone components within specified tolerances.

All Dimensions: Plus or minus 1/8 inch

Maximum Bow, Camber, or Twist: Length/360.

PART 3 - EXECUTION

EXAMINE CONSTRUCTION to receive cast stone components. Notify Architect if construction is not acceptable. Do not begin installation until unacceptable conditions have been corrected.

INSTALL CAST STONE COMPONENTS in conjunction with masonry, complying with requirements of Division-4 Unit Masonry requirements.

SETTING:

Drench cast stone components with clear, running water immediately before installation.

Do not use pry bars or other equipment in a manner that could damage cast stone components.

Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

Set cast stone components in a full bed of mortar, unless otherwise detailed.

Fill vertical joints with mortar.

Make all joints 3/8 inch, except as otherwise detailed.

Leave head joints in copings and similar components open for sealant.

Rake mortar joints 3/4 inch for pointing. Sponge face of each stone to remove excess mortar.

Tuck point joints to a slight concave profile.

SEALANT JOINTS:

Comply with requirements of Division-7 Section "Joint Sealers.

Prime ends of cast stone components, insert properly sized foam backing rod, and install sealant using sealant gun.

Provide sealant joints at following locations and as otherwise detailed:

Cast stone components with exposed tops.

Joints at relieving angles.

At control and expansion joints.

INSTALLATION TOLERANCES: Comply with requirements of Cast Stone Institute Technical Manual for installation tolerances, unless otherwise specified.

VARIATION FROM PLUMB: Do not exceed 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.

VARIATION FROM LEVEL: Do not exceed 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 3/8 inch maximum.

VARIATION IN JOINT WIDTH: Do not vary joint thickness more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.

VARIATION IN PLANE BETWEEN ADJACENT SURFACES (LIPPING): Do not exceed 1/16-inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

SURFACE REPAIR: Repair chipping and other surface damage noticeable when viewed in direct daylight at 10 feet. Repair with matching touchup material provided by manufacturer and in accordance with manufacturer's instructions. Repair methods and results to be approved by Architect.

CLEANING AND PROTECTION

IN-PROGRESS CLEANING: Clean cast stone components as work progresses. Remove mortar fins and smears before tooling joints.

FINAL CLEANING: Clean exposed cast stone, after mortar is thoroughly set and cured. Wet surfaces with water before applying cleaner. Apply cleaner to cast stone in accordance with manufacturer's instructions. Remove cleaner promptly by rinsing thoroughly with clear water.

PROTECTION: Protect cast stone components from splashing and other damage.

END OF SECTION 04 72 00

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Structural steel.
 - 2. Shrinkage-resistant grout.

1.2 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data:
 - 1. Structural-steel materials.
 - 2. High-strength, bolt-nut-washer assemblies.
 - 3. Anchor rods.
 - 4. Shop primer.
 - 5. Galvanized-steel primer.
 - 6. Galvanized repair paint.
 - 7. Shrinkage-resistant grout.
- B. Shop Drawings: Show fabrication of structural-steel components.
- C. Delegated Design Submittal: For structural-steel connections indicated on Drawings to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Mill test reports for structural-steel materials, including chemical and physical properties.
- C. Source quality-control reports.
- D. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).
- B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE or Category CSE.
- C. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

PART 2 - PRODUCTS**2.1 PERFORMANCE REQUIREMENTS**

- A. Comply with applicable provisions of the following specifications and documents:
 - 1. ANSI/AISC 303.
 - 2. ANSI/AISC 360.
 - 3. RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- B. Connection Design Information:
 - 1. Design connections and final configuration of member reinforcement at connections in accordance with ANSI/AISC 303 by fabricator's qualified professional engineer.
 - a. Use Allowable Stress Design; data are given at service-load level.
- C. Moment Connections: Type FR, fully restrained.
- D. Construction: Combined system of moment frame, braced frame, and shear walls.

2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A992/A992M.
- B. Channels, and Angles: ASTM A36/A36M.
- C. Plate and Bar: ASTM A36/A36M.
- D. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade B or ASTM A500/A500M, Grade C structural tubing.
- E. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.
- F. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

- A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325 (Grade A325M), Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH (ASTM A563M, Class 10S), heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1 (Type 8.8-1), compressible-washer type with plain finish.
- B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, heavy-hex head assemblies, consisting of steel structural bolts with splined ends; ASTM A563, Grade DH (ASTM A563M, Class 10S), heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
 - 1. Finish: Plain.

2.4 RODS

- A. Unheaded Anchor Rods: ASTM F1554, Grade 36.
 - 1. Configuration: Straight.
 - 2. Finish: Plain.
- B. Headed Anchor Rods: ASTM F1554, Grade 36, straight.
 - 1. Finish: Plain.

2.5 PRIMER

- A. Steel Primer:
 - 1. Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- B. Galvanized-Steel Primer: MPI#26.
 - 1. Etching Cleaner: MPI#25, for galvanized steel.
 - 2. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.6 SHRINKAGE-RESISTANT GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.

2.8 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened or as indicated.
- 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.

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.
 - 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.

2.10 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 (50 mm).
 - 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, unless indicated to be painted.
- B. Surface Preparation of Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces in accordance with the following specifications and standards:
 - 1. SSPC-SP 2.
 - 2. SSPC-SP 3.
- C. Surface Preparation of Galvanized Steel: Prepare galvanized-steel surfaces for shop priming by thoroughly cleaning steel of grease, dirt, oil, flux, and other foreign matter, and treating with etching cleaner.
- D. Priming: Immediately after surface preparation, apply primer in accordance with manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.11 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
 - 1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
 - 2. Bolted Connections: Inspect and test shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E165/E165M.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E164.
 - d. Radiographic Inspection: ASTM E94/E94M.
4. 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.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Baseplates, Bearing Plates, and Leveling Plates: Clean concrete-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 shrinkage-resistant 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 grouting.
- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

3.3 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
 1. Joint Type: Snug tightened or as indicated.
- 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 ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a 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.

1. Bolted Connections: Inspect and test bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
 - a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1) Liquid Penetrant Inspection: ASTM E165/E165M.
 - 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3) Ultrasonic Inspection: ASTM E164.
 - 4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION 05 12 00

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide cold-formed steel framing where indicated on the Drawings, as specified herein, and
as necessary for complete installation. Types of applications include but are not limited to the following:

- 8 Exterior load-bearing framing
- 9 Exterior non-load-bearing curtain-wall framing.
- 10 Roof rafter framing.

12 RELATED SECTIONS include the following:

- 13 Division 5 Section "Metal Fabrications" for masonry shelf angles and connections.
- 14 Division 6 Section "Rough Carpentry" for roof sheathing using wood-based structural-
use panels, particleboard, fibrous-felted board, and foam-plastic sheathing.
- 16 Division 7 Section "Exterior Insulation and Finish Systems."
- 17 Division 9 Section "Gypsum Board Assemblies" for interior non-load-bearing steel-stud
18 framing and ceiling-suspension assemblies.

20 DELEGATED DESIGN SUBMITTAL: For cold-formed steel framing.

DEFINITIONS

24 MINIMUM BASE STEEL THICKNESS: Minimum uncoated thickness of cold-formed framing delivered to the
26 Project site shall be not less than 95 percent of the thickness used in the cold-formed framing design.

PERFORMANCE REQUIREMENTS:

30 PROVIDE COLD-FORMED STEEL FRAMING capable of withstanding design loads within limits and under
32 conditions as indicated in the Drawings at miscellaneous elements and assemblies.

34 Design framing systems to provide for movement of framing members 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
36 change of 120 deg F.

38 Design framing system to maintain clearances at openings, to allow for construction
tolerances, and to accommodate live load deflection of the primary building structure not
to exceed 1/2 inch maximum for upward or downward movement.

40 Design exterior non-load-bearing curtain-wall framing to accommodate horizontal
deflection without regard for contribution of sheathing materials.

42 DEFLECTION LIMITS: Design framing systems to withstand design loads without deflections greater than the
44 following:

- 46 Exterior Load-Bearing Wall Framing: Horizontal deflection of 1/360 of the wall height minimum
- 47 Exterior Non-Load-Bearing Framing at brick veneer: Horizontal deflection of 1/600 of the wall
- 48 Exterior Non-Load-Bearing Framing without brick veneer: Horizontal deflection of 1/360 of the wall
- 49 Roof Rafter Framing: Horizontal deflection of 1/360 of the horizontally projected span.
- 50 Ceiling Joist Framing: Vertical deflection of 1/240 of the span.

SUBMITTALS

54 PRODUCT DATA: For each type of cold-formed steel framing product and accessory indicated.

56 SHOP DRAWINGS: Provide Shop Drawings prepared by cold-formed steel framing manufacturer.

58 Show layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and
fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing,
supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to
60 adjoining Work.

62 SUBMIT STRUCTURAL ANALYSIS DATA for framing indicated to comply with design loads, and provide shop
drawings signed and sealed by the qualified Professional Engineer responsible for their preparation.

64 MILL CERTIFICATES: From a qualified independent testing agency [or data from steel sheet producer's in-
66 house testing with calibrated test equipment]; indicating steel sheet complies with requirements including base-
steel thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating

thickness. Provide test reports from a qualified independent testing agency if required by authorities having jurisdiction.

WELDING CERTIFICATES: Copies of certificates for welding procedures and personnel.

QUALIFICATION DATA: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

RESEARCH/EVALUATION REPORTS: Provide a third-party evaluation report demonstrating cold-formed steel framing's compliance with building code in effect for Project, from a model code organization ([2018] [2021] and AISI S100) acceptable to authorities having jurisdiction.

QUALITY ASSURANCE

MANUFACTURER QUALIFICATIONS: Member in good standing of the Steel Framing Industry Association (SFIA).

Products to be certified under an independent third-party inspection program administered by an agency accredited by IAS to ICC-ES AC98 IAS Accreditation Criteria for Inspection Agencies.

INSTALLER QUALIFICATIONS: An experienced installer who has completed cold-formed steel framing similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

PROFESSIONAL ENGINEER QUALIFICATIONS: A professional, registered/licensed "Structural Engineer" legally qualified to practice in the state in which the Project is located, experienced in providing engineering services of the kind required herein. Engineering services are defined as those performed for installations of structural work similar to Work specified in this Section in material, design, and extent. Provide certificate indicating compliance with Division-1 requirements for Professional Liability Insurance before submitting shop drawings for review.

CODE COMPLIANCE CERTIFICATION OF STUDS AND TRACKS: Provide documentation that framing members are certified in accordance with the product-certification program of the Steel Framing Industry Association (SFIA).

AISI SPECIFICATIONS: Comply with AISI's "Specification for the Design of Cold-Formed Steel Structural Members" (AISI S100) and "North American Standard for Cold-Formed Steel Structural Framing" (AISI S240) for calculating structural characteristics of cold-formed steel framing:

DELIVERY, STORAGE, AND HANDLING

PROTECT COLD-FORMED STEEL FRAMING from corrosion, deformation, and other damage during delivery, storage, and handling. Store cold-formed steel framing, protect with a waterproof covering, and ventilate to avoid condensation, as required in AISI S202.

PART 2 - PRODUCTS

MANUFACTURERS: All products to be manufactured by current members of the Steel Stud Manufacturers Association (SSMA) or the Steel Framing Industry Association (SFIA). Subject to compliance with requirements, manufacturers offering cold-formed steel framing that may be incorporated into the Work include, but are not limited to, the following:

- California Expanded Metal Products Co.
- ClarkDietrich Consolidated Fabricators Corp.
- Dale Industries, Inc. MarinoWare; Div. of Ware Industries, Inc.
- Scafco Corp. Steel Construction Systems.
- Steeler, Inc. Studco Building Systems
- Super Stud Building Products, Inc. United Metal Products, Inc.

STEEL MATERIALS

Framing Members, General: Comply with AISI S240 for conditions indicated.
Steel Sheet: ASTM A1003, structural grade, metallic coated, of grade and coating as follows:
Grade: ST33H for minimum base steel thickness of 0.0428 inch (18-gage) and less; ST50H, for minimum base steel thickness of 0.0538 inch (16-gage) and greater.
Coating: CP 60: G60 (Z180).

Steel Sheet for [Vertical Deflection] [Drift] [Rigid] [Foundation] Clips: ASTM A1003/A1003M, ASTM A653, structural steel, zinc coated, of grade and coating as follows:
Grade: [33 (230)] [50 (340), Class 1] [As required by structural performance].
Coating: CP 90: G90 (Z275).

LOAD AND NON-LOAD-BEARING COLD-FORMED METAL FRAMING

Minimum base-steel thickness (all components typical): 0.0428 inch (18 gage)

Structural-Steel Framing (Steel Studs): Manufacturer's standard C-shaped steel studs, of web depths and strength/section modulus indicated on Drawings, punched, with stiffened flanges, complying with AISI S240

Structural-Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated on the Drawings, 1-1/4 inch flange-width, unpunched, with unstiffened flanges, complying with AISI S240, of same base steel thickness as associated structural-steel framing units

Steel Box or Back-to-Back Headers: Manufacturer's standard C-shapes used to form header beams, of web depths and strength/section modulus as indicated on the Drawings with 1-3/8 inch minimum flange width, with stiffened flanges.

Steel Double-L Headers: Manufacturer's standard L-shapes used to form header beams, of web depths and strength/section modulus as indicated on the Drawings with 1-1/2 inch minimum flange width, with stiffened flanges

Single Deflection Track (only at non-load bearing framing): Manufacturer's single, deep-leg, U-shaped steel track, 2 inch minimum flange-width, unpunched, with unstiffened flanges, of depth required to contain framing units while allowing free vertical movement, with flanges designed to support horizontal and lateral loads.

Product: ClarkDietrich; [BlazeFrame DL Deflection Track](#) or comparable product.

Slotted Deflection Track (only at non-load bearing framing): Manufacturer's slotted deflection track, deep-leg, U-shaped steel tracks,; unpunched, with unstiffened flanges.

Vertical Deflection Clips: Manufacturer's standard bypass clips, capable of accommodating upward and downward vertical displacement of primary structure.

Product: ClarkDietrich; [MaxTrak Slotted Deflection Track](#) or comparable product.

ROOF-RAFTER FRAMING

Steel Rafters: Manufacturer's standard C-shaped steel sections, of 0.0428 inch (18 gage) minimum base-steel thickness, of web depths and strength/section modulus indicated on Drawings, unpunched, with stiffened flanges, complying with AISI S240.

FRAMING ACCESSORIES

Fabricate steel-framing accessories of the same material, grade, and finish used for framing members.

Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:

Supplementary framing.

Bracing, bridging, and solid blocking.

Product: ClarkDietrich; [Spazzer 5400 Bridging Bar \(SPZS\)](#) [[Spazzer Bar Guard \(SPBG\)](#)] or comparable product.

Web stiffeners.

End clips.

Stud kickers, knee braces, and girts.

Joist hangers and end closures.

Hole reinforcing plates.

Backer plates.

ANCHORS, CLIPS, AND FASTENERS

Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123.

Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-threading steel drill screws.

Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.

Welding Electrodes: Comply with AWS standards.

MISCELLANEOUS MATERIALS

Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B.

Cement Grout: Portland cement, ASTM C 150, 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.

Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.

FABRICATION

FABRICATE COLD-FORMED STEEL FRAMING AND ACCESSORIES plumb, square, and true to line, and with connections securely fastened, according to AISI specifications and standards, manufacturer's written recommendations, and requirements in this Section. Fabricate framing assemblies using jigs or templates. Cut framing members by sawing or shearing; do not torch cut.

FASTEN COLD-FORMED STEEL FRAMING MEMBERS by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.

COMPLY WITH AWS D1.3 REQUIREMENTS and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

LOCATE MECHANICAL FASTENERS and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads. Fasten other materials to cold-formed steel framing by welding, bolting, or screw fastening, according to Shop Drawings.

REINFORCE, STIFFEN, AND BRACE FRAMING ASSEMBLIES to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.

FABRICATION TOLERANCES: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:

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.

Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

EXAMINE SUPPORTING SUBSTRATES and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

PREPARATION

GROUT BEARING SURFACES UNIFORM and level to ensure full contact of bearing flanges or track webs on supporting concrete or masonry construction.

COLD-FORMED FRAMING INSTALLATION:

COMPLY WITH ASTM C 1007 AND AISI S240, unless more stringent requirements are indicated. Shop or field fabricate, or field assemble.

SECURELY ANCHOR to supporting structure. 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.

INSTALL FRAMING AND ACCESSORIES PLUMB, square, and true to line, and with connections securely fastened, according to manufacturer's written recommendations and requirements in this Section. Cut framing members by sawing or shearing; do not torch cut. Fasten cold-formed steel framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.

2 INSTALL FRAMING MEMBERS IN ONE-PIECE LENGTHS, unless splice connections are indicated for track or
tension members.

4 INSTALL TEMPORARY BRACING AND SUPPORTS to secure framing and support loads comparable in
intensity 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.

8 DO NOT BRIDGE BUILDING EXPANSION AND CONTROL JOINTS with cold-formed steel framing.
Independently frame both sides of joints.

10 INSTALL INSULATION IN BUILT-UP EXTERIOR FRAMING MEMBERS, such as headers, sills, boxed joists,
and multiple studs at openings, that are inaccessible on completion of framing work.

14 FASTEN HOLE REINFORCING PLATE over web penetrations that exceed size of manufacturer's standard
punched openings.

16 ERECTION TOLERANCES: Install cold-formed steel framing level, plumb, and true to line to a maximum
allowable tolerance variation of 1/8 inch in 10 feet. 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.

22 LOAD-BEARING WALL INSTALLATION

24 INSTALL CONTINUOUS TOP AND BOTTOM TRACKS sized to match studs. Align tracks accurately and
securely anchor at corners and ends, at spacings indicated on the Drawings.

28 SQUARELY SEAT LOAD-BEARING FRAMING against top and bottom tracks with gap not exceeding of 1/8
inch between the end of wall framing member and the web of track. Fasten both flanges of framing to top and
bottom tracks. Space units as indicated on the Drawings. Set units plumb, except as needed for diagonal bracing or
required for non-plumb walls or warped surfaces and similar configurations. Align units vertically where floor
framing interrupts wall-framing continuity. Where framing units cannot be aligned, continuously reinforce track to
transfer loads.

34 ALIGN FLOOR AND ROOF FRAMING over wall framing units. Where framing cannot be aligned, continuously
reinforce track to transfer loads.

38 ANCHOR FRAMING ABUTTING STRUCTURAL COLUMNS or walls, including masonry walls, to supporting
structure as indicated.

40 INSTALL HEADERS over wall openings wider than framing unit spacings. Locate headers above openings as
indicated, fabricated from compound shapes indicated or required to transfer load to supporting framing, complete
with clip-angle connectors, web stiffeners, or gusset plates. Frame wall openings with not less than a doubled-unit at
each jamb of frame. Fasten jamb members together to uniformly distribute loads. Install runner tracks and jack studs
above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs
same as full-height wall framing units.

48 INSTALL SUPPLEMENTARY FRAMING, blocking, and bracing in wall framing indicated to support fixtures,
equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing. If type of
supplementary support is not indicated, comply with wall-framing manufacturer's written recommendations and
industry standards in each case, considering weight or load resulting from item supported.

52 INSTALL HORIZONTAL BRIDGING in stud system, spaced 48 inches minimum or as otherwise indicated on the
Drawings, and fasten at each wall framing unit intersection. Provide a combination of flat, taut, steel sheet straps of
width and thickness indicated or framing-track type solid units of width and thickness to match wall framing
typically. Fasten flat straps to wall-framing unit flanges and secure solid blocking to framing-unit webs or flanges.

58 INSTALL STEEL SHEET DIAGONAL BRACING STRAPS to both framing-unit flanges, terminate at and fasten
to reinforced top and bottom tracks. Fasten clip-angle connectors to multiple framing-units at ends of bracing and
anchor to structure.

62 INSTALL MISCELLANEOUS FRAMING AND CONNECTIONS, including supplementary framing, web
stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing
system.

66 NON-LOAD-BEARING CURTAIN-WALL INSTALLATION

2 INSTALL CONTINUOUS TRACKS sized to match studs. Align tracks accurately and securely anchor to
3 supporting structure as indicated. Fasten both flanges of studs to top and bottom track, unless otherwise indicated.
4 Space studs as indicated.

6 SET STUDS PLUMB, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces
7 and similar requirements.

8 ISOLATE NON-LOAD-BEARING STEEL FRAMING from building structure to prevent transfer of vertical loads
9 while providing lateral support. Connect vertical deflection clips to bypassing studs and anchor to primary building
10 structure.

12 INSTALL HORIZONTAL BRIDGING in curtain-wall studs, spaced in rows indicated on Shop Drawings but not
13 more than 48 inches apart. Fasten at each stud intersection. Provide horizontal bridging of the following type:

14 Cold-rolled steel channel, welded or mechanically fastened bridging, or a to webs of
15 punched studs.

16 Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-
17 track solid blocking of width and thickness to match studs. Fasten flat straps to stud
18 flanges and secure solid blocking to stud webs or flanges.

19 Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12
20 inches of single deflection track. Install a combination of flat, taut, steel sheet straps of
21 width and thickness indicated and stud or stud-track solid blocking of width and
22 thickness matching studs. Fasten flat straps to stud flanges and secure solid blocking to
23 stud webs or flanges.

24 INSTALL MISCELLANEOUS FRAMING AND CONNECTIONS, including stud kickers, web stiffeners, clip
25 angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable curtain-wall-framing
26 system.

30 JOIST INSTALLATION

32 INSTALL PERIMETER JOIST TRACK sized to match joists. Align and securely anchor or fasten track to
33 supporting structure at corners, ends, and spacings indicated on Shop Drawings.

34 INSTALL JOISTS BEARING ON SUPPORTING FRAME, level, straight, and plumb; adjust to final position,
35 brace, and reinforce. Fasten joists to both flanges of joist track. Install joists over supporting frame with a minimum
36 end bearing of 1-1/2 inches. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers,
37 steel clip angles, or steel-stud sections as indicated on Shop Drawings.

40 SPACE JOISTS not more than 2 inches from abutting walls, and as indicated.

42 FRAME OPENINGS WITH BUILT-UP JOIST HEADERS consisting of joist and joist track, nesting joists, or
43 another combination of connected joists if indicated.

44 INSTALL JOIST REINFORCEMENT at interior supports with single, short length of joist section located directly
45 over interior support, with lapped joists of equal length to joist reinforcement, or as indicated. Install web stiffeners
46 to transfer axial loads of walls above.

48 SECURE JOISTS to load-bearing interior walls to prevent lateral movement of bottom flange.

50 INSTALL MISCELLANEOUS JOIST FRAMING AND CONNECTIONS, including web stiffeners, closure pieces,
51 clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-
52 framing assembly.

54 FIELD QUALITY CONTROL

56 OWNER WILL ENGAGE A QUALIFIED INDEPENDENT TESTING AGENCY to perform field quality-control
57 testing. Testing agency will report test results promptly and in writing to Contractor and Architect. Testing will be
58 performed for:

59 Field and shop welds

62 REMOVE AND REPLACE WORK that does not comply with specified requirements. Additional testing and
63 inspecting, at Contractor's expense, will be performed to determine compliance of corrected Work with specified
64 requirements.

66 REPAIRS AND PROTECTION

68 GALVANIZING REPAIRS: Prepare and repair damaged galvanized coatings on fabricated and installed cold-
69 formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written
70 instructions.

- 2 TOUCHUP PAINTING: Wire brush, clean, and paint scarred areas, welds, and rust spots on fabricated and installed
4 prime-painted, cold-formed steel framing. Paint framing surfaces with same type of shop paint used on adjacent
surfaces.
- 6 PROVIDE FINAL PROTECTION AND MAINTAIN CONDITIONS, in a manner acceptable to manufacturer and
8 Installer, that ensure cold-formed steel framing is without damage or deterioration at time of Substantial
Completion.
- 10 **END OF SECTION 05 40 00**

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Miscellaneous framing and supports.
2. Shelf angles.
3. Metal ladders.
4. Metal bollards.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts and steel pipe sleeves inserts indicated to be cast into concrete or built into unit masonry.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Fasteners.
2. Shop primers.
3. Shrinkage-resisting grout.
4. Manufactured metal ladders.
5. Metal bollards.

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.

C. Delegated Design Submittals: For ladders, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

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: Ladders are to withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

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 A36/A36M.
- C. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.
- D. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
- E. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.

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 B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless steel fasteners for fastening aluminum or stainless steel.
- B. Cast-in-Place Anchors in Concrete: Either threaded or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F2329/F2329M.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
 - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless steel bolts, ASTM F593 (ISO 3506-1), and nuts, ASTM F594 (ASTM F836M).

2.4 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer that contains pigments that make it easily distinguishable from zinc-rich primer.
- B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- E. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

- F. 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 3000 psi (20 MPa).

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 (1 mm) 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 and contour of welded surface matches that of adjacent surface.
- 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. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c.

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.

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 (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.
 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches (50 mm) larger than expansion or control joint.
- B. Galvanize and prime shelf angles located in exterior walls.

2.8 METAL LADDERS

STEEL LADDERS: Fabricate for locations shown, with dimensions, spacings, details, and anchorages as indicated:

COMPLY WITH ANSI A14.3, unless otherwise indicated.

SIDERAILS: Continuous, 1/4 x 3 - inch steel flat bars, with eased edges, spaced 18 inches apart, with retractable safety post, as indicated on the drawings.

BAR RUNGS: 1- inch diameter steel bars, spaced 12 inches o.c.

FIT RUNGS in centerline of side rails; plug-weld and grind smooth on outer rail faces.

SUPPORT EACH LADDER at top and bottom and not more than 60 inches o.c. with welded or bolted bent-steel or hot-formed angle steel brackets of minimum 1/4" thickness x 3" H x 3" wide (at support) x 5" long, providing a minimum 3" clearance between rungs and supporting substrate. Size brackets to support design loads specified in ANSI A14.3.

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.

GALVANIZE EXTERIOR LADDERS typically, including brackets and fasteners. Galvanize interior ladders when indicated.

2.9 METAL BOLLARDS

- A. Fabricate metal bollards from steel shapes, as indicated.
- B. Prime steel bollards with zinc-rich primer.

2.10 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 bearing and leveling plates.
- C. Prime plates with zinc-rich primer.

2.11 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. Galvanize loose steel lintels located in exterior walls.
- C. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.12 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.

2.13 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.

2.14 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. 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.
- C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- D. 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.

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.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor shelf angles securely to existing construction as indicated.

3.3 INSTALLATION OF SHELF ANGLES

- A. Install shelf angles as required to keep masonry level, at correct elevation, and flush with vertical plane.

3.4 INSTALLATION OF METAL LADDERS

- A. Secure ladders to adjacent construction with the clip angles attached to the stringer.
- B. Install brackets as required for securing of ladders welded or bolted to structural steel or built into masonry or concrete.

3.5 INSTALLATION OF METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
- B. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches (75 mm) 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.

3.6 INSTALLATION OF LOOSE 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 shrinkage-resistant grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.7 REPAIRS

- A. Touchup Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 50 00

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide ornamental metalwork, where indicated on the Drawings, as specified herein, and as
8 necessary for complete installation. Types of applications include but are not limited to the following:
Metal Canopies or "Marquees"

10 RELATED SECTIONS include the following:
12 Division 5 Section "Metal Fabrications" for non-ornamental metal fabrications.

SUBMITTALS

14 Product Data: For each type of product indicated, including finishing materials.
16 Shop Drawings: Include plans, elevations, component details, and attachments to other work. Indicate
18 materials and profiles of each ornamental metal member, fittings, joinery, finishes, fasteners,
anchorages, and accessory items.
Provide templates for anchors and bolts specified for installation under other Sections.

QUALITY ASSURANCE

22 FABRICATOR QUALIFICATIONS: A firm experienced in producing ornamental metal similar to that indicated
24 for this Project and with a record of successful in-service performance, as well as sufficient production capacity to
produce required units.

26 WELDING: Qualify procedures and personnel according to the following:
28 AWS D1.1, "Structural Welding Code--Steel."
AWS D1.2, "Structural Welding Code--Aluminum."

30 MOCKUP: Construct a full-size mockup to verify selections made under sample submittals and to demonstrate
32 aesthetic effects and set quality standards for fabrication and installation. Approved mockups may become part of
the completed Work if undisturbed at time of Substantial Completion.

DELIVERY, STORAGE, AND HANDLING

36 STORE ORNAMENTAL METAL INSIDE a well-ventilated area, away from uncured concrete and masonry, and
38 protected from weather, moisture, soiling, abrasion, extreme temperatures, and humidity.

40 DELIVER AND STORE CAST-METAL PRODUCTS in wooden crates surrounded by sufficient packing material
42 to ensure that products will not be cracked or otherwise damaged.

PROJECT CONDITIONS

46 FIELD MEASUREMENTS: Verify actual locations of walls and other construction contiguous with ornamental
48 metal by field measurements before fabrication and indicate measurements on Shop Drawings.

50 ESTABLISHED DIMENSIONS: Where field measurements cannot be made without delaying the Work, establish
52 dimensions and proceed with fabricating railings without field measurements. Coordinate wall and other contiguous
construction to ensure that actual dimensions correspond to established dimensions. If practical, provide allowance
54 for trimming and fitting at site.

COORDINATION

56 COORDINATE INSTALLATION OF ANCHORAGES for ornamental metal items. Furnish setting drawings,
58 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
60 installation.

PART 2 - PRODUCTS**METALS, GENERAL**

PROVIDE MATERIALS with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

ALUMINUM

Provide aluminum materials of alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.

Extruded Bars and Shapes: ASTM B 221, Alloy 6063-T5/T52.

Drawn Seamless Tubing: ASTM B 210 or ASTM B 483, Alloy 6063-T832.

Plate and Sheet: ASTM B 209 Alloy 5005-H32.

Die and Hand Forgings: ASTM B 247, Alloy 6061-T6.

Castings: ASTM B 26, Alloy A356.0-T6.

STEEL AND IRON

Castings: Either gray or malleable iron, unless otherwise indicated.

Gray Iron: ASTM A 48, Class 30, unless another class is indicated or required by structural loads.

Malleable Iron: ASTM A 47.

FASTENERS

Fastener Materials: Unless otherwise indicated, provide the following:

Aluminum Items: Type 304 stainless-steel fasteners.

Uncoated Steel Items: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed, Type 304 stainless-steel fasteners where exposed.

Dissimilar Metals: Type 304 stainless-steel fasteners.

Fasteners for Anchoring to Other Construction: Unless otherwise indicated, select fasteners of type, grade, and class required to produce connections suitable for anchoring indicated items to other types of construction indicated.

Provide concealed fasteners for interconnecting components and for attaching ornamental metal items to other work, unless otherwise indicated.

Anchors: Provide anchors, fabricated from corrosion-resistant materials with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed.

MISCELLANEOUS MATERIALS

WELDING RODS AND BARE ELECTRODES: Select according to AWS specifications for metal alloy welded. For aluminum, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

ZINC-RICH PRIMER: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.

Use primer with a VOC content of 3.5 lb/gal. or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

SHOP PRIMER FOR GALVANIZED STEEL: Zinc-dust, zinc-oxide primer formulated for priming zinc-coated steel and for compatibility with finish paint systems indicated, and complying with SSPC-Paint 5.

BITUMINOUS PAINT: Cold-applied asphalt emulsion complying with ASTM D 1187.

FABRICATION, GENERAL

Assemble items in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

Form ornamental 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.

Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

Form simple and compound curves in bars and extruded shapes by bending members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces.

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.

Mill joints to a tight, hairline fit. Cope or miter corner joints. Fabricate connections that will be exposed to weather in a manner to exclude water.

Provide weep holes where water may accumulate.

Provide necessary rebates, lugs, and brackets to assemble units and to attach to other work. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items, unless otherwise indicated.

- 2 Comply with AWS for recommended practices in shop welding. [Weld] behind finished surfaces without
distorting or discoloring exposed side. Clean exposed welded joints of flux, and dress exposed
and contact surfaces.
- 4 Provide castings that are sound and free of warp, cracks, blowholes, or other defects that impair strength or
appearance. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting
flash, and other casting marks.

FABRICATING ORNAMENTAL CANOPIES

FABRICATE UNITS in conformance to general design indicated on the Drawings, from extruded aluminum shapes and tubes. Miter frame members at exposed corners and connect with concealed splice plates, as applicable. Provide weep-holes on bottom sides of exterior members at regular spacing.

WELDING: Interconnect members with full-length, full-penetration welds, unless otherwise indicated. Use welding method appropriate for metal and finish indicated and that develops full strength of members joined. Finish exposed welds and surfaces smooth, flush, and blended to match adjoining surfaces.

BRACKETS, FITTINGS, AND ANCHORS: Provide wall brackets, fittings, and anchors to connect units to other work, unless otherwise indicated. Furnish inserts and other anchorage devices to connect units to substrate. Coordinate anchorage devices with supporting structure.

FINISHES, GENERAL

COMPLY WITH NAAMM'S "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

ALUMINUM FINISHES

- Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- Class II, Anodic Finish: AA-M12C22A31 clear anodized coating or AA-M12C22A32/A34 colored anodized coating (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Architectural Class II, clear or integrally colored or electrolytically deposited color coating 0.010 mm or thicker) complying with AAMA 611.
- Color: As indicated on the Drawings, or if not indicated, as selected by Architect from full-range of available colors.

STEEL AND IRON FINISHES

- Galvanizing: Hot-dip galvanize products made from rolled, pressed, and forged steel shapes, castings, plates, bars, and strips to comply with ASTM A 123.
- Hot-dip galvanize steel and iron hardware indicated to be galvanized to comply with ASTM A 153.
- Preparation for Shop Priming: After galvanizing, thoroughly clean ornamental metal of grease, dirt, oil, flux, and other foreign matter, and treat with metallic-phosphate pretreatment.
- Factory-Primed Finish: Apply air-dried primer immediately after cleaning and pretreatment, to provide a minimum dry film thickness of 2 mils per applied coat, to surfaces that will be exposed after assembly and installation, and to concealed, nongalvanized surfaces.

PART 3 - EXECUTION

EXAMINATION

EXAMINE SUBSTRATES AND CONDITIONS, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of ornamental metal.

PROCEED WITH INSTALLATION only after unsatisfactory conditions have been corrected.

INSTALLATION, GENERAL

PROVIDE ANCHORAGE DEVICES and fasteners where needed to secure ornamental metal to in-place construction.

PERFORM CUTTING, DRILLING, AND FITTING REQUIRED to install ornamental metal. Set products accurately in location, alignment, and elevation; measured from established lines and levels. Provide temporary bracing or anchors in formwork for items to be built into concrete, masonry, or similar construction.

2 FIT EXPOSED CONNECTIONS ACCURATELY TOGETHER to form tight, hairline joints or, where indicated,
with uniform reveals and spaces for sealants and joint fillers. Where cutting, welding, and grinding are required for
4 proper shop fitting and jointing of ornamental metal, restore finishes to eliminate evidence of such corrective work.

6 DO NOT CUT OR ABRABE 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.
8 Install concealed gaskets, joint fillers, insulation, and flashings as work progresses.

10 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 yet to be performed at same
location.

12 CORROSION PROTECTION: Coat concealed surfaces of aluminum that will be in contact with grout, concrete,
masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

16 INSTALLING ORNAMENTAL AWNINGS:

18 MOUNT UNITS AT HEIGHTS and in positions indicated. Secure to framing and blocking with specified fasteners.

20 CLEANING

22 CLEAN METALS BY WASHING THOROUGHLY with clean water and soap, rinsing with clean water, and
drying with soft cloths, unless otherwise recommended by the fabricator or metal finish manufacturer.

26 TOUCHUP PAINTING: Immediately after erection, clean field welds, bolted connections, and abraded areas of
shop paint, and paint exposed areas with same material.

28 GALVANIZED SURFACES: Clean field welds, bolted connections, and abraded areas and repair galvanizing to
30 comply with ASTM A 780.

32 PROTECTION

34 PROTECT FINISHES OF ORNAMENTAL METAL from damage during construction period with temporary
protective coverings approved by ornamental metal fabricator. Remove protective covering at time of Substantial
Completion.

38 RESTORE FINISHES DAMAGED DURING INSTALLATION and construction period so no evidence remains of
40 correction work. Return items that cannot be refinished in the field to the shop; make required alterations and
refinish entire unit, or provide new units.

42 **END OF SECTION 05 70 00**

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide decorative metal railings where indicated on the Drawings, as specified herein, and as
8 necessary for complete installation. Types of applications include but are not limited to the following:
Post-supported railings with glass infill.

10 DESIGN/BUILD: In addition to providing the Work of this Section, provide Professional Engineering Design
12 Services for the following:

DEFINITIONS

14 RAILINGS: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas,
16 pedestrian guidance and support, visual separation, or wall protection.
18

PERFORMANCE REQUIREMENTS

20 ENGINEER RAILINGS to withstand structural loads indicated, determine allowable design working stresses of
22 railing materials based on the following:

24 Steel: 72 percent of minimum yield strength.

26 Glass (at infill panels): Provide a 4X factor of safety for all designed glass-loads

28 STRUCTURAL PERFORMANCE: Provide railings capable of withstanding the effects of gravity loads and the
following loads and stresses within limits and under conditions indicated:

30 Handrails and Top-Rail of Guardrails:

Uniform distributed load: 50 lbf/ft. applied in any direction at the top.

32 Concentrated load: 200 lbf applied in any direction at the top.

Uniform and concentrated loads need not be assumed to act concurrently.

34 Infill of Guards:

Concentrated load: 50 lbs applied horizontally on an area of 1 sq. ft at any point of the system.

36 Infill load need not be assumed to act concurrently with handrail or top-rail at guard loads.

38 CONTROL OF CORROSION: Prevent galvanic action and other forms of corrosion by insulating metals and other
40 materials from direct contact with incompatible materials.

SUBMITTALS

42 SUBMIT SHOP DRAWINGS to include plans, elevations, sections, details, and attachments to other work. For
44 installed products indicated to comply with design loads, include structural analysis data signed and sealed by the
46 qualified professional engineer responsible for their preparation.

48 SUBMIT MATERIAL SAMPLES for initial selection of products involving color or texture, including mechanical
finishes, submit samples of the following:

50 Railing section, of each distinctly different linear railing member, including handrails, top rails, posts, and
balusters including but not limited to:

52 Each type of glass required.

Fittings and brackets.

54 SUBMIT ASSEMBLED MOCKUP SECTION of railing system after approval of materials above, made from full-
56 size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections.

58 SUBMIT QUALIFICATION DATA: For professional engineer.
60

QUALITY ASSURANCE

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.

INSTALLER QUALIFICATIONS: Entity with no less than three (3) years of successful experience in installation of Work similar to the requirements for this project, acceptable to the manufacturer of the primary products specified, as verifiable by a current written statement from the manufacturer.

PROFESSIONAL ENGINEER QUALIFICATIONS: Legally qualified to practice in jurisdiction where Project is located, experienced in providing Professional Engineering services of the type required for the Work of this Section, maintaining Professional Liability Insurance coverage as required in the Supplementary Conditions.

SOURCE LIMITATIONS: Obtain each type of railing through one source from a single manufacturer.

PRODUCT OPTIONS: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. 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. Performance characteristics are indicated by criteria subject to verification by one or more methods including structural analysis, preconstruction testing, field testing, and in-service performance. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

PRECONSTRUCTION TESTING: Engage a qualified independent testing agency to test railings according ASTM E 894 and ASTM E 935 for compliance with specified requirements for performance. Provide test specimens and assemblies representative of proposed materials and construction. Select sizes and configurations of assemblies to adequately demonstrate capability of railings to comply with performance requirements. Notify Architect seven days in advance of the dates and times when assemblies will be constructed. When testing is complete, remove assemblies; do not reuse materials on Project.

WELDING: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

MOCKUP: Build mockup to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation. Build mockup for each form and finish of railing consisting of two posts, top rail, infill area, and anchorage system components that are full height and are not less than 60 inches in length.

DELIVERY STORAGE AND HANDLING

DELIVER MATERIALS in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

STORE MATERIALS inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack materials flat to prevent sagging.

PROJECT CONDITIONS

FIELD MEASUREMENTS: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings. If field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabrication without field measurements, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

COORDINATION

COORDINATE FABRICATION SCHEDULE with construction progress to avoid delaying the Work.

COORDINATE INSTALLATION OF ANCHORAGES for railings. 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. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 – PRODUCTS**BASIS OF DESIGN MANUFACTURER:**

Livers Bronze Co., Contact: Al Livers @ 816-300-2828 x 440 (www.liversbronze.com)

ACCEPTABLE, ALTERNATIVE MANUFACTURERS include the following:

Blumcraft of Pittsburgh (www.blumcraft.com)

Couturier Iron Craft Inc. (www.couturierironcraft.com)

METALS, GENERAL

PROVIDE METAL MATERIALS with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

ALUMINUM: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with strength and durability properties for each aluminum form required not less than that of alloy and temper designated below.

Plate and Sheet: ASTM B 209, Alloy 6061-T6.

STEEL AND IRON

Tubing: ASTM A 513, Type 5 (mandrel drawn).

Bars: Hot-rolled, carbon steel complying with ASTM A 29, Grade 1010.

Plates, Shapes, and Bars: ASTM A 36/A 36M.

Castings: Either gray or malleable iron, unless otherwise indicated.

Gray Iron: ASTM A 48, Class 30, unless another class is indicated or required by structural loads.

Malleable Iron: ASTM A 47.

GLASS AND GLAZING MATERIALS

Tempered Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type I (transparent flat glass), Quality-Q3. Provide products that have been tested for surface and edge compression according to ASTM C 1048 and for impact strength according to 16 CFR 1201 for Category II materials.

Thickness for Glass Infill Panels: As required by structural loads, but not less than 12.0 mm.

Provide safety glass permanently marked with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.

Laminated Glass: ASTM C 1172, Condition A (uncoated), Type I (transparent flat glass), Quality-Q3 with clear, polyvinyl butyral interlayer not less than 0.060 inch thick.

Kind: LA (laminated annealed) LHS (laminated heat strengthened) LT (laminated tempered).

Glass color: Class 1 (clear).

FASTENERS: Provide the following:

Aluminum Components: Type 304 stainless-steel fasteners.

Stainless-Steel Components: Type 304 stainless-steel fasteners.

Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed; Type 304 stainless-steel fasteners where exposed.

Dissimilar Metals: Type 304 stainless-steel fasteners.

Provide concealed fasteners for interconnecting railing components and for attaching railings to other work, unless exposed fasteners are unavoidable.

Provide tamper-resistant flat-head machine screws for exposed fasteners, unless otherwise indicated.

WOOD MATERIALS:

HARDWOOD RAIL: Fabricate from built-up sections of hardwood, with exposed surfaces consisting only of solid material (not laminated), in “oval” profile as indicated on the Drawings, with manufacturer's shop-applied finish complying to AWI “custom” grade standards, secured to recessed metal subrail.

Wood Species: African “Wengé Wood” (*Millettia laurentii*)

Stain Color: “Expresso”

Finish: AWI Conversion Varnish w/ matte/satin sheen

MISCELLANEOUS MATERIALS

WELDING RODS AND BARE ELECTRODES: Select according to AWS specifications for metal alloy welded.

UNIVERSAL SHOP PRIMER: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79. Use primer with a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2 BITUMINOUS PAINT: Cold-applied asphalt emulsion complying with ASTM D 1187.

4 FABRICATION

6 FABRICATE RAILINGS TO COMPLY WITH REQUIREMENTS indicated for design, dimensions, member sizes
8 and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

10 ASSEMBLE RAILINGS in the shop to greatest extent possible to minimize field splicing and assembly.
12 Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and
coordinated installation. Use connections that maintain structural value of joined pieces.

14 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.

16 FORM WORK TRUE TO LINE and level with accurate angles and surfaces. Cut, reinforce, drill, and tap as
18 indicated to receive finish hardware, screws, and similar items.

20 WELDED CONNECTIONS: Cope components at connections to provide close fit, or use fittings designed for this
purpose. Weld all around at connections, including at fittings. Use materials and methods that minimize distortion
22 and develop strength and corrosion resistance of base metals.

24 Obtain fusion without undercut or overlap.

Remove flux immediately.

26 At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing
and welded surface matches contours of adjoining surfaces.

28 MECHANICAL CONNECTIONS: Connect members with concealed mechanical fasteners and fittings. Fabricate
members and fittings to produce flush, smooth, rigid, hairline joints.

30 FORM SIMPLE AND COMPOUND CURVES by bending members in jigs to produce uniform curvature for each
32 repetitive configuration required; maintain cross section of member throughout entire bend without buckling,
twisting, cracking, or otherwise deforming exposed surfaces of components.

34 PROVIDE WALL RETURNS at ends of wall-mounted handrails, unless otherwise indicated. Close ends of returns,
36 unless clearance between end of rail and wall is 1/4 inch or less.

38 PROVIDE WALL BRACKETS, FLANGES, miscellaneous fittings and anchors to interconnect railing members to
40 other work, unless otherwise indicated.

42 GLAZING PANEL FABRICATION

44 FABRICATE GLAZING PANELS to sizes and shapes required; provide for proper edge clearance and bite on
glazing panels.

46 INFILL PANELS: Provide [tempered] [laminated, annealed] [laminated, heat-strengthened] [laminated, tempered]
48 glass panels for both straight and curved sections.

50 FINISHES

52 COMPLY WITH NAAMM'S "Metal Finishes Manual for Architectural and Metal Products" for recommendations
54 for applying and designating finishes. Protect mechanical finishes on exposed surfaces from damage by applying a
strippable, temporary protective covering before shipment.

56 APPEARANCE OF FINISHED WORK: Variations in appearance of abutting or adjacent pieces are acceptable if
58 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
60 are assembled or installed to minimize contrast.

62 ALUMINUM FINISHES: Finish designations prefixed by AA comply with the system established by the
Aluminum Association for designating aluminum finishes.

64 Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated;
Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored
66 or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.

68 Color: [Light bronze] [Champagne].

70 BAKED-ENAMEL, POWDER-COAT FINISH (over galvanized steel material): Provide coating manufacturer's
minimum 1.5 mil thick continuous, cross-linked enamel finish coating, consisting of TGIC polyester powder applied

by electrostatic or tribo-charged spraying, then baked in a curing oven to fuse the deposited powder to the substrate, in full compliance with coating manufacturer’s written instructions for pretreatment, application, minimum dry-mil thickness (if thicker) and baking procedures.

Color/texture: “Hammer-toned” texture in custom-color to match Architect’s sample

PART 3 – EXECUTION

EXAMINE adjacent Work for verification of installation tolerances and for compliance with other requirements and conditions affecting installation. Verify critical dimensions, and examine supporting structure and other conditions under which the Work of this Section is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

INSTALL units where indicated on the Drawings, using mounting methods and fasteners appropriate to substrate as recommended by unit manufacturer, and in compliance with the manufacturer's instructions. Install units plumb and level, firmly anchored in locations and at position indicated.

FASTENING TO IN-PLACE CONSTRUCTION: Provide anchorages and fasteners where necessary for securing the Work of this Section to in-place construction. Provide threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as appropriate.

CUTTING, FITTING, AND PLACEMENT: Perform cutting, drilling, and fitting required for installing the work of this Section. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting. Set units accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

GENERAL RAILING INSTALLATION REQUIREMENTS

FIT EXPOSED CONNECTIONS TOGETHER to form tight, hairline joints.

INSTALLATION TOLERANCE:

Set posts plumb within a tolerance of 1/16 inch in 3 feet.

Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.

CORROSION PROTECTION: Coat concealed surfaces of aluminum and copper alloys that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

ADJUST RAILINGS BEFORE ANCHORING to ensure matching alignment at abutting joints.

FASTENING TO IN-PLACE CONSTRUCTION: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

RAILING CONNECTIONS

WELDED CONNECTIONS: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in Part 2 "Fabrication" Article whether welding is performed in the shop or in the field.

ANCHORING POSTS

ANCHOR POSTS TO METAL SURFACES with flanges, angle type, or floor type as required by conditions, connected to posts and to metal supporting members as follows:

For steel railings, weld flanges to posts and bolt to metal-supporting surfaces.

ANCHORING RAILING ENDS to metal surfaces with flanges bolted to metal surfaces and [welded to railing ends] [or] [connected to railing ends using nonwelded connections].

ATTACHING HANDRAILS TO WALLS: Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as follows:

For drywall partitions, use hanger or lag bolts set into wood blocking or backing between studs. Coordinate with carpentry work to locate backing members.

For steel-framed gypsum board partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.

2 **INSTALLING GLASS PANELS**

4 **POST-SUPPORTED GLASS RAILINGS:** Install assembly to comply with railing manufacturer's written
6 instructions and with requirements in other Part 3 articles. Erect posts and other metal railing components, then set
factory-cut glass panels. Do not cut, drill, or alter glass panels in field. Protect edges from damage.

8 **CLEANING**

10 **CLEAN ALL EXPOSED SURFACES** according to manufacturer's recommendations after removing temporary
12 labels and protective coatings. Clean aluminum by washing thoroughly with clean water and soap, rinsing with clean
water, and wiping dry.

14 **CLEAN AND POLISH GLASS** to be without streaks.

16 **CLEAN WOOD RAILS** by wiping with a damp cloth and then wiping dry.

18 **PROTECTION**

20 **PROTECT FINISHES OF RAILINGS FROM DAMAGE** during construction period with temporary protective
22 coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

24 **RESTORE FINISHES DAMAGED** during installation and construction period so no evidence remains of correction
26 work. Return items that cannot be refinished in field to shop; make required alterations and refinish entire unit, or
provide new units.

28

END OF SECTION 05 73 00

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Rooftop equipment bases and support curbs.
4. Wood blocking and nailers.
5. Wood furring.
6. Wood sleepers.
7. Plywood backing panels.

1.2 ACTION SUBMITTALS

A. Product Data:

1. For each type of process and factory-fabricated product.
2. For preservative-treated wood products.

1.3 INFORMATIONAL SUBMITTALS

A. Material Certificates:

1. For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
2. For preservative-treated wood products. Indicate type of preservative used and net amount of preservative retained.

B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Power-driven fasteners.
5. Post-installed anchors.
6. Metal framing anchors.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: Comply with DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber 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 or omit grade stamp and provide certificates of grade compliance issued by grading agency.
3. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content:

1. Boards: 19 percent.
2. Dimension Lumber: 19 percent unless otherwise indicated.

C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable design stresses, as published by manufacturer, are to meet or exceed those indicated. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 PRESERVATIVE TREATMENT

A. Preservative Treatment by Pressure Process: AWP A 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.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that 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.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, 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 (460 mm) above the ground in crawlspaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 FIRE-RETARDANT-TREATMENT

A. General: Where fire-retardant-treated materials are indicated, materials are to 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 E84, 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 (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
- C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
- E. Application: Treat items indicated on Drawings.

2.4 DIMENSION LUMBER FRAMING

- A. Non-Load-Bearing Interior Partitions by Grade: Construction, Stud, or No. 3 grade.
 - 1. Application: Interior partitions not indicated as load bearing.
 - 2. Species:
 - a. Southern pine or mixed southern pine; SPIB.
 - b. Northern species; NLGA.
- B. Framing Other Than Non-Load-Bearing Partitions by Grade: No. 2 grade.
 - 1. Application: Framing other than interior partitions not indicated as load bearing.
 - 2. Species:
 - a. Southern pine; SPIB.
 - b. Douglas fir-larch; WCLIB or WWPA.

2.5 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D5456 and manufactured with an exterior-type adhesive complying with ASTM D2559.
 - 1. Extreme Fiber Stress in Bending, Edgewise: [3100 psi (21.3 MPa)] [2900 psi (20.0 MPa)] [2600 psi (17.9 MPa)] [2250 psi (15.5 MPa)] <Insert value> for 12-inch nominal- (286-mm actual-) depth members.
 - 2. Modulus of Elasticity, Edgewise: [2,000,000 psi (13 700 MPa)] [1,800,000 psi (12 400 MPa)] [1,500,000 psi (10 300 MPa)] <Insert value>.

2.6 MISCELLANEOUS LUMBER

- A. 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.

B. Dimension Lumber Items: Construction or No. 2 grade lumber of any species.

2.7 PLYWOOD BACKING PANELS

A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, Exterior, C-C Plugged, or Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 1/2-inch (13-mm) nominal thickness.

2.8 FASTENERS

A. General: Fasteners are to be of size and type indicated and comply with requirements specified in this article for material and manufacture. Provide nails or screws, in sufficient length, to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.

1. Where rough 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 A153/A153M or of Type 304 stainless steel.

B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

C. 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.

2.9 METAL FRAMING ANCHORS

A. Allowable design loads, as published by manufacturer, are to meet or exceed those indicated. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors are to be punched for fasteners adequate to withstand same loads as framing anchors.

B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 (Z180) coating designation.

1. Use for interior locations unless otherwise indicated.

2.10 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets:

Retain one of three subparagraphs below if required. First subparagraph is suitable for dry masonry. Second is more suitable for applications close to the ground or likely to remain damp, and third is a combination sill-sealer gasket and termite barrier.

1. Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch (25-mm) nominal thickness, compressible to 1/32 inch (0.8 mm); selected from manufacturer's standard widths to suit width of sill members indicated.

2. Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.
3. Self-adhering sheet consisting of 64mils (1.6 mm) of rubberized asphalt laminated on one side to a 4-mil- (0.10-mm-) thick, polyethylene-film reinforcement, and with release liner on adhesive side; **formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction**.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- C. Set work to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- 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. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- G. Securely attach rough 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 (IBC).
 2. ICC-ES evaluation report for fastener.

3.2 PROTECTION

- A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes wet enough that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 00

WORK INCLUDED: Provide Wood Decking where indicated on the Drawings, as specified herein, and as necessary for complete installation. The Work of this Section includes the following:

Solid-wood roof-decking

DELIVERY, STORAGE, AND HANDLING: Schedule delivery of wood decking to avoid extended on-site storage and to avoid delaying the Work. Store materials under cover and protected from weather and contact with damp or wet surfaces. Provide for air circulation within and around stacks and under temporary coverings. Stack wood decking with surfaces that are to be exposed in the final Work protected from exposure to sunlight.

PRODUCTS

SOLID-WOOD DECKING: Comply with DOC PS 20 and with applicable grading rules of inspection agencies certified by ALSC's Board of Review. Provide wood decking with 15 percent maximum moisture content at time of dressing, and as follows:

Face Species: Douglas fir-south or Southern pine.

Decking Nominal Size: 2 x 6 inch

Decking Configuration: Provide tongue-and-groove configuration that complies with research/evaluation report.

Face Grade: Decorative: Sound knots and natural characteristics are allowed, including chipped edge knots, short end splits, seasoning checks, and some pin holes. Face knot holes, stain, end slits, skip, roller split, and planer burn are not allowed.

Face Surface: Smooth

Edge Pattern: Vee-grooved

ACCESSORY MATERIALS

FASTENERS FOR DECKING: Provide fastener size and type complying with requirements in "Installation" Article for installing laminated decking.

Nails: Common; complying with ASTM F 1667, Type I, Style 10.

Spikes: Round; complying with ASTM F 1667, Type III, Style 3.

INSTALLATION ADHESIVE: For wood decking indicated to be of diaphragm design and construction, provide adhesive that complies with research/evaluation report.

SEALANT: Elastomeric joint sealant complying with requirements in Division-07 Section "Joint Sealants" for Use NT (nontraffic) and for Uses M, G, A, and, as applicable to joint substrates indicated, O joint substrates.

PENETRATING SEALER: Clear sanding sealer compatible with topcoats specified for use over it.

EXECUTION

EXAMINATION: Examine walls and support framing in areas to receive wood decking for compliance with installation tolerances and other conditions affecting performance of wood decking. Proceed with installation only after unsatisfactory conditions have been corrected.

INSTALL wood decking to comply with manufacturer's written instructions, and as follows:.

Locate end joints for combination simple and two-span continuous lay-up

Nail each course of wood decking at each support with one nail slant nailed above the tongue and one nail straight nailed through the face.

Slant nail each course of wood decking to the tongue of the adjacent course at 30 inches o.c. and within 12 inches of the end of each unit. Stagger nailing in adjacent courses 15 inches.

Use 12d nails for 2x decking

GLUE ADJOINING DECKING COURSES together by applying a 3/8-inch bead of adhesive on the top of tongues according to research/evaluation report.

APPLY JOINT SEALANT to seal roof decking at exterior walls between decking and supports located at exterior walls.

ADJUSTING: Repair damaged surfaces and finishes after completing erection. Replace damaged decking if repairs are not approved by Architect.

PROTECTION: Provide temporary waterproof covering as the Work progresses to protect roof decking until roofing is applied.

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wall sheathing.
2. Roof sheathing.
3. Parapet sheathing.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product.

1.3 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated plywood.
2. Fire-retardant-treated plywood.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested in accordance with ASTM E119; 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 PRESERVATIVE-TREATED PLYWOOD

- A. Preservative Treatment by Pressure Process: AWWA 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.

- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.

- C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.3 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 in accordance with ASTM E84, 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 (3.2 m) beyond the centerline of the burners at any time during the test.
 - 1. Exterior Type: Treated materials are to comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering in accordance with ASTM D2898. Use for exterior locations and where indicated.
 - 2. Design Value Adjustment Factors: Treated lumber plywood is to be tested in accordance with ASTM D5516 and design value adjustment factors are to be calculated in accordance with ASTM D6305. Span ratings after treatment are to be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency.
- E. Application: Treat plywood indicated on Drawings.

2.4 WALL SHEATHING

- A. Plywood Sheathing, Walls: Either DOC PS 1 or DOC PS 2, Exposure 1, Structural I sheathing.
- B. Oriented-Strand-Board Sheathing, Walls: DOC PS 2, Exposure 1, Structural I sheathing.

2.5 ROOF SHEATHING

- A. Plywood Sheathing, Roofs: Either DOC PS 1 or DOC PS 2, Exposure 1, Structural I sheathing.
- B. Oriented-Strand-Board Sheathing, Roofs: DOC PS 2, Exposure 1, Structural I sheathing.

2.6 PARAPET SHEATHING

- A. Plywood Sheathing, Parapets: Either DOC PS 1 or DOC PS 2, Exposure 1, Structural I sheathing.
- B. Oriented-Strand-Board Sheathing, Parapets: DOC PS 2, Exposure 1, Structural I sheathing.

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. For roof, parapet, and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.

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 2304.10.1, "Fastening Schedule," in the ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.
- D. Coordinate wall, parapet, and roof 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.

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. Nail to wood framing.
 - b. Screw to cold-formed metal framing.
 - c. Space panels 1/8 inch (3 mm) apart at edges and ends.

END OF SECTION 06 16 00

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Wood roof trusses.
2. Wood girder trusses.

1.2 ALLOWANCES

- A. Provide wood truss bracing under the Metal-Plate-Connected Truss Bracing Allowance as specified in Section 012100 "Allowances."

1.3 ACTION SUBMITTALS

- A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.

- B. Shop Drawings: Show fabrication and installation details for trusses.

1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
2. Indicate sizes, stress grades, and species of lumber.
3. Indicate locations of permanent bracing required to prevent buckling of individual truss members due to design loads.
4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
6. Show splice details and bearing details.

- C. Delegated-Design Submittals: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For metal-plate-connected wood trusses, signed by officer of truss-fabricating firm.

- B. Evaluation Reports: For the following, from ICC-ES:

1. Metal-plate connectors.
2. Metal truss accessories.

1.5 QUALITY ASSURANCE

- A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.

1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
 2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
- B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in TPI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Handle and store trusses to comply with recommendations in SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal-plate-connected wood trusses.
- B. Structural Performance: Metal-plate-connected wood trusses are to be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1.
- C. Comply with applicable requirements and recommendations of TPI 1, TPI DSB, and SBCA BCSI.
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

2.2 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of any rules-writing agency certified by the American Lumber Standard Committee (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. Provide dry lumber with 19 percent maximum moisture content at time of dressing.
- B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry."

2.3 METAL CONNECTOR PLATES

- A. Fabricate connector plates to comply with TPI 1.
- B. Hot-Dip Galvanized-Steel Sheet: ASTM A653/A653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 (Z180) coating designation; and not less than 0.036 inch (0.9 mm) thick.

2.4 FASTENERS

- A. Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
 - 2. Where trusses are exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Nails, Brads, and Staples: ASTM F1667.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Allowable design loads, as published by manufacturer, are to comply with or exceed those of basis-of-design products. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors are to be punched for fasteners adequate to withstand same loads as framing anchors.
- B. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A653/A653M, G60 (Z180) coating designation.

2.6 FABRICATION

- A. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
 - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1.
- B. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Anchor trusses securely at bearing points; use metal truss tie-downs or truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.

- F. Securely connect each truss ply required for forming built-up girder trusses.
- G. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
 - 1. Install bracing to comply with Section 061000 "Rough Carpentry."
- H. Install wood trusses within installation tolerances in TPI 1.
- I. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- J. Replace wood trusses that are damaged or do not comply with requirements.

END OF SECTION 06 17 53

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide Exterior Architectural Woodwork, where indicated on the Drawings, as specified
herein, and as necessary for complete installation. Types of applications include but are not limited to the following:

- 8 Standing & running trim
- 9 Shutters
- 10 Ornamental work
- 11 Wood Columns
- 12 Shop priming of exterior woodwork

14 RELATED SECTIONS include the following:
15 Division 6 Section "Rough Carpentry" for exposed framing.
16 Division 9 Section "Painting" for field finishing of exterior architectural woodwork.

18 SUBMITTALS

20 PRODUCT DATA: For each type of product and process specified and incorporated into items of exterior
22 architectural woodwork during fabrication, finishing, and installation. Include data for wood-preservative treatment
24 from chemical treatment manufacturer and certification by treating plant that treated materials comply with
26 requirements. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by
treating plant that treated materials comply with requirements.

28 SHOP DRAWINGS: Show location of each item, dimensioned plans and elevations, large-scale details, attachment
29 devices, and other components. Show details full size. Show locations and sizes of blocking and nailers, including
30 concealed blocking and reinforcement specified in other Sections.

32 LIST OF MOCKUP MATERIALS: List generic product names together with manufacturers, manufacturers' product
33 names, model numbers, and other information as required to identify materials used. Submittal is for information
34 only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract
Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.

36 SAMPLES FOR VERIFICATION: For the following:
37 Lumber for exterior wood stain finish, 50 sq. in., for each species, with 1/2 of exposed surface finished with
38 coating specified in Division 9 Section "Exterior Wood Stains."
39 Lumber and panel products for shop-applied opaque finish, 8 by 10 inches for panels and 50 sq. in. for
40 lumber, for each finish system and color, with 1/2 of exposed surface finished.

42 LEED CERTIFICATES FOR CREDIT MR 7: Chain-of-custody certificates certifying that products specified to be
43 fabricated from "certified wood" comply with forest certification requirements. Include evidence that mill is
44 certified for chain of custody by an FSC-accredited certification body. Include statement indicating costs for each
45 certified wood product.

46 PRODUCT CERTIFICATES: Signed by manufacturers of woodwork certifying that products furnished comply
47 with requirements.

48 QUALITY STANDARD COMPLIANCE CERTIFICATES: AWI Quality Certification Program certificates

50 QUALIFICATION DATA: For firms and persons specified in "Quality Assurance" Article to demonstrate their
51 capabilities and experience. Include lists of completed projects with project names and addresses, names and
52 addresses of architects and owners, and other information specified.

54 QUALITY ASSURANCE

56 INSTALLER QUALIFICATIONS: An experienced installer who has completed architectural woodwork similar in
57 material, design, and extent to that indicated for this Project and whose work has resulted in construction with a
58 record of successful in-service performance.

59 AWI CERTIFICATION: Utilize a certified participant in AWI's Quality Certification Program.

60 FABRICATOR QUALIFICATIONS: A firm experienced in producing architectural woodwork similar to that
61 indicated for this Project and with a record of successful in-service performance, as well as sufficient production
62 capacity to produce required units.

63 AWI CERTIFICATION: Utilize a certified participant in AWI's Quality Certification Program.

SOURCE LIMITATIONS FOR FABRICATION AND INSTALLATION: Engage a qualified woodworking firm to assume undivided responsibility for fabricating and installing woodwork specified in this Section.

QUALITY STANDARD: Comply with AWI's "Architectural Woodwork Quality Standards" for grades of exterior architectural woodwork, construction, finishes, and other requirements.

PROVIDE AWI QUALITY CERTIFICATION PROGRAM CERTIFICATE indicating that woodwork complies with requirements of grades specified.

MOCKUP:

PROVIDE MATERIALS for construction of a field mockup of each different exterior woodwork material and color indicated, showing the full range of exposed textures, and dimensions to be expected in the completed construction.

BEFORE INSTALLING EXTERIOR ARCHITECTURAL WOODWORK, build mockup to verify selections made under sample Submittals and to demonstrate aesthetic effects. Refer to Division-1 Section Quality Requirements for general requirements of Mockup.

PROJECT CONDITIONS

WEATHER LIMITATIONS: Proceed with installation of exterior woodwork only when existing and forecasted weather conditions permit work to be performed and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.

FIELD MEASUREMENTS: Where woodwork is 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. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.

ESTABLISHED DIMENSIONS: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

COORDINATE sizes and locations of framing, blocking, reinforcements, and other related units of Work specified in other Sections to ensure that exterior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

MATERIALS

PROVIDE MATERIALS THAT COMPLY WITH requirements of the AWI quality standard for each type of woodwork and quality grade indicated and, where the following products are part of exterior woodwork, with requirements of the referenced product standards that apply to product characteristics indicated, and as follows:

Hardboard: AHA A135.4.

Softwood Plywood: DOC PS 1, - Exterior type.

Medium-Density Fiberboard: ANSI A208.2, Grade MD-Exterior Glue

Medium-Density Overlay (MDO) Plywood: Exterior softwood plywood with MDO surface both sides

WOOD-PRESERVATIVE-TREATED MATERIALS: Treat blocking and nailers by pressure process and treat other exterior architectural woodwork either by pressure process, unless fabricated from naturally durable wood. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material, for materials exposed to view. Pressure-treat aboveground items with preservatives to a minimum retention of 0.25 lb/cu. ft. Kiln-dry lumber and plywood after treatment to a maximum moisture content, respectively, of 19 and 15 percent. Use preservative chemicals acceptable to authorities having jurisdiction and containing no arsenic or chromium and one of the following:

Ammoniacal, or amine, copper quat (ACQ).

Copper bis (dimethyldithiocarbamate) (CDDC).

Ammoniacal copper citrate (CC).

Copper azole, Type A (CBA-A).

Oxine copper (copper-8-quinolinolate) in a light petroleum solvent.

FIRE-RETARDANT-TREATMENT (FRT): Provide materials that comply with performance requirements of AWPAC20 (for lumber) and AWPAC27 (for plywood), exterior type. Use chemical formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials. 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. Kiln-dry materials before and after treatment to levels required for untreated materials. Do not use treated materials that do not comply with requirements of referenced woodworking standard or that are warped, discolored, or otherwise defective. Identify fire-retardant-treated materials with appropriate classification marking of UL, U.S. Testing, Timber Products Inspection, or another testing and inspecting agency acceptable to authorities having jurisdiction.

Application: Treat all concealed wood blocking in exterior wall assemblies, unless otherwise indicated

STANDING AND RUNNING TRIM:

NATURAL-WOOD TRIM FOR SEMI-TRANSPARENT FINISH: Comply with AWI Section 300, Custom grade. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work. Assemble casings in plant except where shipping limitations require field assembly.

WOOD SPECIES: Western red cedar – rough-sawn smooth-surfaced finish typically.

TRIM FOR OPAQUE FINISH: Provide engineered, composite trim units in width(s) as indicated in the Drawings, in maximum lengths available to minimize field joints and splices, and as manufactured by one of the following:

Thickness: 4/4 Trim boards (actual .624 inch min thickness) and/or 5/4 Trim boards (actual 1.0 inch min thickness) as indicated on the Drawings

Finish: Smooth

Finish: Wood Grain Textured

CEMENT FIBER Acceptable Manufacturers:

“HardieTrim”, www.jameshardie.com

CELLULAR PVC acceptable Manufacturers:

“Azek Trimboards”, www.azek.com

“Fypon Cellular PVC Trim”, www.fypon.com

“Kleer” by Kleer Products, www.kleerlumber.com

“Koma Trim” by Kommerling USA, www.komatrimboards.com

“Versatex Trimboards” by Wolfpac Technologies, www.versatex.com

WOOD-BASED-COMPOSITE acceptable Manufacturers:

“MiraTEC” by CMI, www.miratectrim.com

“PrimeTrim” by Georgia-Pacific, www.gp.com

“Royal Wood Composite Trimboards”, www.royal-wood.com

“SmartSide Trim” by Louisiana-Pacific, www.lpcorp.com

“TruWood Trim” by Collins, www.collinswood.com

“Weyerhaeuser ChoiceTrim” by Collins Products LLC

INSTALLATION MATERIALS

Blocking, Shims, and Nailers: Softwood or hardwood lumber, preservative-treated (or fire-retardant treated if indicated below) unless otherwise indicated, kiln-dried to less than 15 percent moisture content.

Nails: hot-dip galvanized or stainless steel, with 3/16 inch minimum head diameter

Screws: hot-dip galvanized or stainless steel. At metal framing supports, provide self-drilling screws as recommended by metal-framing manufacturer.

Anchors: Select material, type, size, and finish required for each substrate for secure anchorage, penetrating a minimum of 1-1/4 inch into wood substrate materials. Provide nonferrous-metal or hot-dip galvanized anchors and inserts, unless otherwise indicated. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

Power nailing systems are permitted using fasteners with equal or greater performance characteristics (including but not limited to withdrawal and bending strength and corrosion resistance) of galvanized nails.

Sealant for opaque-finished trim: “Pro-Series Quad Advanced Formula” sealant by OSI or equal ASTM C 920, Type S, Grade NS, use NT material.

FABRICATION, GENERAL

Natural wood moisture-content: 7 to 12 percent.

Fabricate exterior woodwork to dimensions, profiles, and details indicated. Maintain a minimum 10 degree positive slope (100 degree from vertical) on all horizontal surfaces, to provide positive drainage and to prevent moisture accumulation on all trim members (except at pre-primed surfaces of engineered composite trim).

Ease edges of natural-wood to radius indicated for the following:

Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.

Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.

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.

EXTERIOR SHUTTERS (painted or stained finish): Comply with AWI Section 1200, Custom Grade.

WOOD SPECIES: Western Red Cedar

WOOD COLUMNS (painted finish): Comply with applicable AWI requirements for custom grade.
WOOD SPECIES: Pine, poplar or other softwood suitable for intended purpose.

WOOD TRIM: Provide Architectural wood trim units manufactured by the following:

BRACKET TYPE A: "Footed Crescent", 18-1/4 x 18-1/4" x 1-1/2" thick unit as manufactured by Vintage Woodworks (vintagewoodworks.com) or approved equal.

BRACKET TYPE B: "Dove's Wing", 20" high x 24" deep x 1-1/2" thick unit as manufactured by Vintage Woodworks (vintagewoodworks.com) or approved equal.

BRACKET TYPE C: "Cupid's Arrow", 20" x 20" x 1-1/2" thick unit as manufactured by Vintage Woodworks (vintagewoodworks.com) or approved equal.

EXTERIOR WOOD BRACKETS: Comply with applicable AWI Quality Standard - Custom grade. Assemble units in plant with water-proof adhesives, typically.

WOOD SPECIES: Western red cedar – smooth finish typically - except as otherwise indicated.

SHOP PRIMING

WOODWORK FOR OPAQUE FINISH: Provide pre-primed materials by the manufacturer, or shop-prime materials for finish with one coat of primer specified in Division 9 Section "Painting."

WOODWORK FOR TRANSPARENT FINISH: Shop seal woodwork for transparent finish with stain (if required), other required pretreatments, and first coat of finish as specified in Division-9 Section "Painting."

PREPARATIONS FOR FINISHING: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.

BACKPRIMING: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork.

PART 3 - EXECUTION

PREPARATION: Condition woodwork to average prevailing humidity conditions in installation areas before installation. Deliver concrete inserts and similar anchoring devices to be built into substrates well in advance of time substrates are to be built. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

INSTALLATION

INSTALL WOODWORK TO COMPLY WITH AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.

INSTALL WOODWORK TRUE AND STRAIGHT with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces or repair damaged finish at cuts.

FIRE-RETARDANT-TREATED WOOD: Handle, store, and install fire-retardant-treated wood to comply with recommendations of chemical treatment manufacturer, including those for adhesives used to install woodwork.

PRESERVATIVE-TREATED WOOD: Where cut or drilled in field, treat cut ends and drilled holes according to AWPA M4.

INSTALL STANDING AND RUNNING TRIM with minimum number of joints possible, using full-length pieces to the greatest extent possible. Cut into the exposed face of the trim-board material. Do not route-out over 5/16 inch of trim material. Locate all joints over a solid framing member, and double-nail each side of joint. Stagger joints in adjacent and related members. Cope at returns, miter at corners, and use scarf joints for end to end joints, to provide tight fitting joints with full surface contact throughout length of joint.

DO NOT APPLY WOOD OR WOOD-COMPOSITE TRIM over wet sheathing, or closer than 6 inches from finished grade. Do not apply wood or wood-composite trim directly over concrete or masonry – separate with metal flashing, 10-mil polyethylene film or 30 lb building felt.

ANCHOR WOODWORK TO ANCHORS OR BLOCKING built in or directly attached to substrates. Do not use staples, or T-nails. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind

2 nailing. Use fine finishing nails for exposed nailing, countersunk and filled flush with woodwork. Double nail all
trim at 16 inches maximum on-center, with an additional nail on boards over 12 inch nominal thickness. Do not nail
4 into a cut edge of trim material. Anchor between 1/2 min. to 2 inches maximum from the edge - penetrating 1-1/4
inch minimum into wood substrate, or not less than three (3) screw-threads through metal framing. Anchor trim
6 from one end to the other – do not nail towards the ends from the center.

8 FASTENING OPAQUE-FINISHED TRIM: Do not countersink fasteners more than 1/8 inch. Fill all fastener recess,
dents and all other surface imperfections with a non-shrink epoxy-based filler equal to “Kampel’s WoodFil Epoxy”,
allow to dry, sand smooth with 100 grit sandpaper, and spot-prime to match adjacent prime coating.

12 INSTALLATION OF WOOD-COMPOSITE TRIM: Cut with a fine-tooth hand saw or power saw with a carbide-
tipped combination-blade. Field-prime all cut ends or machined surfaces prior to installation. Space all butt and scarf
joints 1/8” apart and apply sealant into the full depth of the joint. Do not use galvanized finish nails without heads,
14 ring-shank nails, or fine-threaded screws. Finish-paint within sixty (60) days after installation, or re-prime using
material and methods approved for use by trim manufacturer.

18 INSTALLATION OF CELLULAR-PVC TRIM: Cut with a power saw with a carbide-tipped combination-blade –
do not use fine-toothed metal-cutting blades. Space all butt and scarf joints 1/4” apart (per 18 feet member) and
apply sealant throughout the full depth of the joint. Do not use galvanized finish nails without heads, ring-shank
20 nails, or fine-threaded screws for fastening.

22 SEAL ALL TRIM members to prevent water intrusion. Do not allow water to stand or to leak behind any trim units.
Seal all butt joints and where trim abuts siding, window frames, door frames or similar conditions.

24 COMPLETE THE FINISHING WORK specified in this Section to extent not completed at shop or before
26 installation of woodwork. Where exposed, fill nail and screw holes with filler that will finish in color similar to
adjacent woodwork. Refer to Division 9 Sections for final finishing of installed Architectural Woodwork.

30 ADJUSTING AND CLEANING

32 REPAIR DAMAGED AND DEFECTIVE WOODWORK, where possible, to eliminate functional and visual
defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

34 CLEAN WOODWORK on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged
36 or soiled areas.

38 END OF SECTION 06 40 13

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide exterior simulated woodwork where indicated on the Drawings, as specified herein,
and as necessary for complete installation. Types of applications include but are not limited to the following:

8 Exterior Decorative Columns
10 Exterior standing and running trim, including decorative running cornice trim
12 Verge board trim at gable ends
14 Surround trims
16 Door head units
Arches
Moldings
Dentil Blocks and brackets
Rosettes

18 RELATED SECTIONS include the following:

20 Division 6 Section "Rough Carpentry" for exposed framing.
22 Division 6 Section "Exterior Architectural Woodwork" for products of wood materials
Division 9 Section "Painting" for field finishing of exterior simulated woodwork.

SUBMITTALS

26 PRODUCT DATA: For each type of product and process specified and incorporated into items of exterior simulated
28 woodwork during fabrication, finishing, and installation.

30 SHOP DRAWINGS: Show location of each item, dimensioned plans and elevations, large-scale details, attachment
32 devices, and other components. Show details full size. Show locations and sizes of blocking and nailers, including
concealed blocking and reinforcement specified in other Sections.

34 LIST OF MOCKUP MATERIALS: List generic product names together with manufacturers, manufacturers' product
36 names, model numbers, and other information as required to identify materials used. Submittal is for information
only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract
Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.

QUALITY ASSURANCE

40 SOURCE LIMITATIONS FOR FABRICATION AND INSTALLATION: Engage a qualified firm to assume
42 undivided responsibility for fabricating and installing products specified in this Section.

44 PERFORMANCE REQUIREMENTS: Provide simulated wood trim units which have been manufactured,
46 fabricated and installed to maintain performance criteria stated by manufacturer without defects, damage or failure.

48 INSTALLER QUALIFICATIONS: An experienced installer who has completed Exterior Simulated Woodwork
similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction
with a record of successful in-service performance.

50 FABRICATOR QUALIFICATIONS: A firm experienced in producing architectural woodwork similar to that
52 indicated for this Project and with a record of successful in-service performance, as well as sufficient production
54 capacity to produce required units.

DELIVERY, STORAGE & HANDLING

58 DELIVER MATERIALS in manufacturer's original, unopened, undamaged containers with identification labels
intact.

60 STORE MATERIALS protected from exposure to harmful weather conditions and at temperature and humidity
62 conditions recommended by manufacturer.

PROJECT CONDITIONS

WEATHER LIMITATIONS: Proceed with installation of exterior simulated woodwork only when existing and forecasted weather conditions permit work to be performed and at least one coat of specified finish to be applied without exposure to rain, snow, or dampness.

FIELD MEASUREMENTS: Where simulated woodwork is 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. Locate concealed framing, blocking, and reinforcements that support simulated woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.

ESTABLISHED DIMENSIONS: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

EXTERIOR SIMULATED WOODWORK – STANDING AND RUNNING TRIM: “Fypon” Standard Molded Millwork, as manufactured by Fypon Ltd., P.O. Box 365, Stewartstown, PA 17363-0365; telephone: (800) 537-5349, (717) 993-2593; Fax: (717) 993-3782; website: www.fypon.com. Refer to Drawings for unit type, and product model number/names as appropriate.

DECORATIVE COLUMNS (pre-primed for field-painted finish): Decorative columns of composite material, as manufactured by the following entity or approved equal:

HB&G’s “PermaCast” Columns (size and type as indicated on the Drawings)

DECORATIVE (FIBERGLASS) CORNICE TRIM (pre-primed for field-painted finish): Provide profile/type of size and locations as indicated in the Drawings, as manufactured by the following entity or approved equal:

EDON Corporation, 1160 Easton Rd. Horsham, PA 19044
Phone: 215-672-8050, website: edon.com

JOINT COMPOUND AND ADHESIVE: As recommended by unit manufacturer.

INSTALLATION MATERIALS: As recommended by unit manufacturer, mechanical fasteners for application. Pneumatic nail gun permissible for use (lower driving pressure suitable); staple gun not permissible for use:

Blocking, Shims, and Nailers: Softwood or hardwood lumber, fire-retardant treated, kiln-dried to less than 15 percent moisture content.

Nails: hot-dip galvanized.

Screws: stainless steel.

For metal framing supports, provide self-drilling screws as recommended by metal-framing manufacturer.

Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts, unless otherwise indicated. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 - EXECUTION

EXAMINATION: Verify substrate conditions which have been previously installed under other sections, are acceptable for product installation in accordance with manufacturer’s instructions.

INSTALLATION

COMPLY WITH MANUFACTURER’S installation instructions, product carton instructions and as required herein for installation of simulated woodwork.

INSTALL TRUE AND STRAIGHT with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches. Scribe and cut to fit adjoining work, and refinish cut surfaces and fill with joint compound at all joints.

ANCHOR TO ANCHORS OR BLOCKING built in or directly attached to substrates. Secure to grounds, stripping and blocking with countersunk, concealed fasteners and blind nailing. Use fine finishing nails for exposed nailing, countersunk and filled flush with putty.

COMPLETE THE FINISHING WORK specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail and screw holes with matching putty where exposed.

FIELD FINISHING: Refer to Division 9 Sections for final finishing of installed Simulated Woodwork.

ADJUSTING AND CLEANING

- 2 REPAIR DAMAGED AND DEFECTIVE SIMULATED WOODWORK, where possible, to eliminate functional
- 4 and visual defects; where not possible to repair, replace entirely. Adjust joinery for uniform appearance.
- 6 CLEAN SIMULATED WOODWORK on exposed and semiexposed surfaces. Touch up shop-applied finishes to
- 8 restore damaged or soiled areas.
- 10 PROTECT INSTALLED PRODUCT and finish surfaces from damage during construction.

END OF SECTION 06 65 00

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide Building Insulation where indicated on the Drawings, as specified herein, and as
8 necessary for complete installation. Types of applications include but are not limited to the following:

- 8 Perimeter insulation at exterior walls under slabs-on-grade.
- 10 Perimeter foundation wall insulation
- 10 Concealed building insulation, including
 - 12 Rigid Wall insulation with vapor barriers
 - 12 Batt Insulation with vapor barriers in walls and ceilings
 - 14 Loose-fill insulation

14 RELATED SECTIONS include the following:

- 16 Division 3 Section "Cast-in-Place Concrete."
- 16 Division 4 Section "Unit Masonry Assemblies" for insulation installed in cavity walls and masonry cells.
- 18 Division 6 Section "Rough Carpentry" for foam-plastic board sheathing over wood framing.
- 20 Division 7 Section "Exterior Insulation and Finish Systems--Class PB for insulation specified as part of
22 these systems.
- 22 Division 7 Section for Roofing System, which includes insulation specified as part of roofing construction.
- 24 Division 9 Sections "Gypsum Board Assemblies" for installation in metal-framed assemblies of insulation
26 specified by reference to this Section.

26 **QUALITY ASSURANCE**

28 FIRE-TEST-RESPONSE CHARACTERISTICS: Provide insulation and related materials with the fire-test-response
30 characteristics indicated, as determined by testing identical products per test method indicated below by UL or
32 another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with
34 appropriate markings of applicable testing and inspecting agency.

- 32 Surface-Burning Characteristics: ASTM E 84.
- 34 Fire-Resistance Ratings: ASTM E 119.
- 36 Combustion Characteristics: ASTM E 136.

36 **DELIVERY, STORAGE, AND HANDLING**

38 PROTECT INSULATION MATERIALS from physical damage and from deterioration by moisture, soiling, and
40 other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling,
42 storing, and protecting during installation.

42 PROTECT PLASTIC INSULATION as follows:

- 44 Do not expose to sunlight, except to extent necessary for period of installation and concealment.
- 46 Protect against ignition at all times. Do not deliver plastic insulating materials to Project site before
48 installation time.
- Complete installation and concealment of plastic materials as rapidly as possible in each area of
construction.

50 **PART 2 - PRODUCTS**

52 PROVIDE PREFORMED UNITS, sized to fit applications indicated; selected from manufacturer's standard
54 thicknesses, widths, and lengths, as appropriate for conditions of use indicated.

56 PERIMETER INSULATION: Provide 2 inch thick minimum extruded-polystyrene board meeting ASTM C 578,
58 Type VI (1.8 lb/cu. Ft. minimum) Subject to compliance with requirements, available manufacturers include but are
not limited to:

- 58 DiversiFoam Products.
- 60 Dow Chemical Company.
- 62 Owens Corning.
- Pactiv Building Products Division

64 INTERIOR RIGID WALL INSULATION: Rigid, cellular polystyrene thermal insulation formed by expansion of
66 polystyrene resin beads or granules in a closed mold to comply with ASTM C 578 for Type I, (0.9-lb/cu. ft.) and
with maximum flame-spread and smoke-developed indices of 75 and 450, respectively.

2 RIGID WALL INSULATION BOARDS: Provide foil-faced, polyisocyanurate boards meeting ASTM C 1289, Type
I, Class 1, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, based on tests
4 performed on unfaced core on thicknesses up to 4 inches. Subject to compliance with requirements, available
manufacturers include but are not limited to:

6 Atlas Roofing Corporation.
Dow Chemical Company.
Rmax, Inc.

8 BOARD INSULATION FILL UNDER INTERIOR CONCRETE SLABS: ASTM C 578 Type VII, 2.20 lb/cu. Ft.
10 density extruded-polystyrene boards with maximum flame-spread and smoke-developed indexes of 75 and 450,
12 respectively. Provide “CertiFoam 60” by DiversiFoam Products, or equivalent product of equal compressive
strength by Dow, Owens Corning, or Pactiv Building Products.

14 BOARD INSULATION FILL UNDER EXTERIOR CONCRETE SLABS or PLAZAS: ASTM C 578 Type VII,
2.20 lb/cu. Ft. density extruded-polystyrene boards with maximum flame-spread and smoke-developed indexes of
16 75 and 450, respectively. Provide “CertiFoam 60 Plaza Deck” with drainage channels on the bottom surface and at
18 all four (4) sides, as manufactured by DiversiFoam Products, or equivalent product of equal compressive strength by
Dow, Owens Corning, or Pactiv Building Products.

20 TYPICAL UN-FACED BATT or BLANKET INSULATION: Provide un-faced batts or blankets consisting of
22 fiberglass, or rock-wool meeting ASTM C 665, Type I (blankets without membrane facing) with maximum flame-
spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E 136 for combustion
characteristics. Subject to compliance with requirements, available manufacturers include but are not limited to:

24 GLASS-FIBER INSULATION:
CertainTeed Corporation.
26 Johns Manville Corporation.
Knauf Fiber Glass.
28 Owens Corning.

30 ROCK-WOOL FIBER INSULATION:
Fibrex Insulations Inc.
Owens Corning.
32 Thermafiber.

34 TYPICAL KRAFT-FACED BATT OR BLANKET INSULATION: Kraft Faced, Glass-Fiber Blanket Insulation
meeting ASTM C 665, Class A (membrane-faced surface with a flame-spread index of 25 or less); Category 1
36 (membrane is a vapor barrier), faced with asphalt impregnated kraft-scrim vapor-retarder membrane on 1 face.

or

38 TYPICAL FOIL-FACED BATT OR BLANKET INSULATION: Foil-faced glass or mineral-fiber meeting ASTM
40 C 665, Type III (blankets with reflective membrane facing), Class A (membrane-faced surface with a flame spread
of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-
42 polyethylene vapor-retarder membrane on one face; consisting of fibers manufactured from glass, slag wool, or rock
wool. When multiple layers are indicated or otherwise required to meet thermal resistance, vapor barrier may be
44 omitted on additional layers. Subject to compliance with requirements, manufacturers offering products that may be
incorporated into the Work include, but are not limited to, the following:

46 GLASS-FIBER INSULATION:
CertainTeed Corporation.
Johns Manville Corporation.
48 Knauf Fiber Glass.
Owens Corning.

50 SLAG-WOOL-/ROCK-WOOL-FIBER INSULATION:
Fibrex Insulations Inc.
52 Owens Corning.
Thermafiber.

54 LOOSE-FILL INSULATION: Provide glass-Fiber loose-fill insulation meeting ASTM C 764, of either Type I (for
56 pneumatic application) or Type II (for poured application); with maximum flame-spread and smoke-developed
indexes of 5.

60 VAPOR RETARDERS

62 STANDARD POLY VAPOR BARRIER: ASTM D 4397, 6 mils thick, with maximum permeance rating of 0.13
perm.

64 FIRE-RETARDANT VAPOR BARRIER (where exposed): 2 outer layers of polyethylene film laminated to an inner
66 reinforcing layer consisting of either a nonwoven grid of nylon cord or polyester scrim and weighing not less than
22 lb/1000 sq. ft., with maximum permeance rating of 0.1317 perm and with flame-spread and smoke-developed
68 indexes of not more than 5 and 60, respectively. Subject to compliance with requirements, available products
include but are not limited to:

70 Raven Industries Inc.; DURA-SKRIM 2FR.

2 Reef Industries, Inc.; Griffolyn T-55 FR.

4 **AUXILIARY INSULATING MATERIALS**

6 **VAPOR-RETARDER TAPE:** Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder

8 **ADHESIVE FOR BONDING INSULATION:** Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

12 **PROTECTION BOARD:** Premolded, semirigid asphalt/fiber composition board, 1/4 inch thick, formed under heat and pressure, of standard sizes.

14 **EAVE VENTILATION TROUGHS:** Preformed, rigid fiberboard or plastic sheets designed and sized to fit between roof framing members and to provide cross ventilation between insulated attic spaces and vented eaves.

16 **MISCELLANEOUS INSULATION ANCHORS:** Provide adhesively attached, spindle-type anchors (angle-shaped when required), insulation-retaining washers and insulation standoffs with suitable anchor adhesive with demonstrated capability to bond insulation anchors securely to substrates indicated where insulation is required in areas where metal framing or other insulation retention system is not indicated.

22 **PART 3 - EXECUTION**

24 **EXAMINE SUBSTRATES AND CONDITIONS,** with Installer present, for compliance with requirements for Sections in which substrates and related work are specified and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

28 **PREPARATION**

30 **CLEAN SUBSTRATES OF SUBSTANCES** harmful to insulations or vapor retarders, including removing projections capable of puncturing vapor retarders or of interfering with insulation attachment.

34 **INSTALLATION, GENERAL**

36 **COMPLY WITH INSULATION MANUFACTURER'S WRITTEN INSTRUCTIONS** applicable to products and application indicated. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed at any time to ice and snow.

38 **EXTEND INSULATION IN THICKNESS INDICATED** to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

40 **WATER-PIPING COORDINATION:** If water piping is located on inside of insulated exterior walls, coordinate location of piping to ensure that it is placed on warm side of insulation and insulation encapsulates piping.

42 **APPLY SINGLE LAYER OF INSULATION** to produce thickness indicated, unless multiple layers are otherwise shown or required to make up total thickness.

44 **INSTALLATION OF PERIMETER AND UNDER-SLAB INSULATION**

46 **ON VERTICAL SURFACES,** set units in adhesive applied according to manufacturer's written instructions. Use adhesive recommended by insulation manufacturer. If not indicated, extend insulation a minimum of 24 inches below exterior grade line.

48 **PROTECT BELOW-GRADE INSULATION** on vertical surfaces from damage during backfilling by applying protection board. Set in adhesive according to insulation manufacturer's written instructions.

50 **PROTECT TOP SURFACE OF HORIZONTAL INSULATION** from damage during concrete work by applying protection board.

52 **INSTALLATION OF GENERAL BUILDING INSULATION**

2 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.

4 SEAL JOINTS BETWEEN CLOSED-CELL (NONBREATHING) INSULATION units by applying adhesive,
6 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.

8 SET VAPOR-RETARDER-FACED UNITS with vapor retarder to warm side of construction, unless otherwise
10 indicated. Do not obstruct ventilation spaces, except for firestopping. Tape joints and ruptures in vapor retarder, and
seal each continuous area of insulation to surrounding construction to ensure airtight installation.

12 INSTALL MINERAL-FIBER BLANKETS IN CAVITIES formed by framing members according to the following
14 requirements:

16 Use blanket widths and lengths that fill the cavities formed by framing members. If more than one length is
required to fill cavity, provide lengths that will produce a snug fit between ends.

18 Place blankets in cavities formed by framing members to produce a friction fit between edges of insulation
and adjoining framing members.

20 For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets
mechanically and support faced blankets by taping stapling flanges to flanges of metal studs.

22 INSTALL BOARD INSULATION ON CONCRETE OR CMU SUBSTRATES by adhesively attached, spindle-
24 type insulation anchors as follows:

26 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.

28 Apply insulation standoffs to each spindle to create cavity width indicated between concrete substrate and
insulation.

30 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.

32 Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

34 PLACE LOOSE-FILL INSULATION into spaces indicated, either by pouring or by machine blowing, to comply
with ASTM C 1015. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform
36 density, but do not compact excessively

38 INSTALLATION OF VAPOR RETARDERS

40 EXTEND VAPOR RETARDER to extremities of areas to be protected from vapor transmission. Secure in place
42 with adhesives or other anchorage system as indicated. Extend vapor retarder to cover miscellaneous voids in
insulated substrates, including those filled with loose-fiber insulation.

44 SEAL VERTICAL JOINTS in vapor retarders over framing by lapping not less than two wall studs. Fasten vapor
46 retarders to wood framing at top, end, and bottom edges; at perimeter of wall openings; and at lap joints. Space
fasteners 16 inches o.c.

48 BEFORE INSTALLING VAPOR RETARDER, apply urethane sealant to flanges of metal framing including runner
50 tracks, metal studs, and framing around door and window openings. Seal overlapping joints in vapor retarders with
vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Seal butt joints with vapor-
52 retarder tape. Locate all joints over framing members or other solid substrates.

54 FIRMLY ATTACH VAPOR RETARDERS to metal framing and solid substrates with vapor-retarder fasteners as
56 recommended by vapor-retarder manufacturer.

58 SEAL JOINTS CAUSED BY PIPES, conduits, electrical boxes, and similar items penetrating vapor retarders with
vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarder.

60 REPAIR TEARS OR PUNCTURES in vapor retarders immediately before concealment by other work. Cover with
vapor-retarder tape or another layer of vapor retarder.

64 PROTECTION

66 PROTECT INSTALLED INSULATION AND VAPOR BARRIERS FROM DAMAGE due to harmful weather
exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject
68 to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00

PART 1 - GENERAL

2
4 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 PROVIDE all labor, materials and equipment necessary for a field-applied Exterior Finish System (EFS) , as indicated on the Drawings, as specified herein, and as required for a complete installation. The Work of this Section includes the following type of system:
8 Cement-Board Stucco (CBS)

RELATED SECTIONS:

12 Division-06 “Rough Carpentry” Section for wood-blocking required to anchor system
14 Division-07 “Sealant” Section for sealants used in association with the CBS

16 ALTERNATES: The Work of this Section is affected by an Alternate. Refer to Division-01 “Alternates” Section for additional information.

18 SYSTEM DESCRIPTION: A composite exterior-finish soffit system consisting of a stucco-like acrylic finish-coating over a reinforced, cementitious base-coating trowel-applied to cement-boards.

SUBMITTALS**QUALITY ASSURANCE**

26 INSTALLER Entity with no less than three (3) years of successful experience in installation of Work similar to the requirements for this project, who is approved, licensed, or otherwise certified by the prime manufacturer of the EFS system. All materials and all installation procedures shall comply with written requirements and recommendations of the EFS manufacturer. Use skilled technicians specifically trained and experienced with application of the EFS being installed. Provide proper equipment and adequate manpower and supervision on the job site to install the EFS in compliance with the manufacturer’s written installation recommendations and details.

34 SUBMIT REPORTS by the local, EFS manufacturer’s representative of the pre-installation conference (indicated below) and installation “observation reports” at the following stages of Work progress:

36 At start of “board installation”
38 At start of “base-coat installation”, and
At start of “finish coat installation” (4 site visits total)

40 CONDUCT A PRE-INSTALLATION CONFERENCE at the Project Site to review substrate requirements, field conditions, critical details of installation, overall project scheduling, and timing of subsequent manufacturer representative’s site observations.

DELIVERY STORAGE AND HANDLING

46 DELIVER MATERIALS in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.

48 STORE MATERIALS inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack materials flat to prevent sagging.

PROJECT CONDITIONS

56 WEATHER CONDITIONS affect base-coat and finish-coat application and drying time required. Hot and dry conditions limit working time and accelerate drying; adjust the Work schedule to accommodate. Cool or damp conditions extend working time and retard drying; provide additional temporary protection against wind, dust, dirt, rain and freezing as required.

COORDINATION

64 COORDINATE INSTALLATION OF ANCHORAGES for the Work of this Section. Furnish directions as applicable for installing anchorages, which may include items with integral anchors that are to be pre-installed or embedded in supporting substrates. Deliver such items to Project site in time for installation.

WARRANTY

MANUFACTURER'S SPECIAL SYSTEM WARRANTEE: Provide EFS system manufacturer's standard, ten (10) year limited materials and moisture-protection warrantee.

PART 2 – PRODUCTS

ACCEPTABLE EFS MANUFACTURERS: The Contract Documents are based on use of base-coat, reinforcing fabric, and finish coat materials manufactured by one of the following. Other manufacturers must be pre-approved (prior to bidding):

“Dryvit System, Inc.”
“Senergy Inc.”
“STO Corporation”

EFS COMPONENTS FOR CEMENT-BOARD STUCCO (CBS):

CEMENT-BOARDS: Complying with ASTM C 1325 in maximum lengths available to minimize end-to-end butt joints, 1/2 inch thickness unless otherwise indicated on the Drawings. Available products include:

Basis of Design: “PermaBase”, by National Gypsum Company, Inc.
Acceptable Alternatives: Wonderboard, by Custom Building Products; or Durock, by USG

STEEL DRILL SCREW FASTENERS (for anchoring Cement-Board to framing): ASTM A653 hot-dipped galvanized units steel drill screws meeting ASTM C 1002 or ASTM C 954, wafer-head units typically:
Metal Framing: # 8 min. Type S-12 units w/ wings x length required for min. 4 exposed thread into metal

CEMENT-BOARD JOINT TAPE: 4 inch wide glass fiber alkali-resistant mesh tape.

SEALANT (between cement-boards at Control-Joints): Comply with Division-07 “Joint-Sealant” Section

ACCESSORY AND EXPANSION/CONTROL JOINT TRIM: Provide rigid, PVC (polyvinyl chloride) plastic accessory trim as manufactured by “Plastic Components, Inc.”, 9051 NW 97th Terrace, Miami, Florida 33178 (800) 327-7077, website: www.plasticcomponents.com, or approved equal as follows:

Surface-mounted Corner Bead: # 2209 (at soffit perimeters typically)
Surface-mounted Control Joint (CJ's on Drawings): # 22027-16
Surface mounted “L” Bead: # 2221-50 (at terminations or openings in system)

REINFORCING MESH: EFS Manufacturer's standard, symmetrical balanced, interlaced open-weave fabric treated for alkaline resistance and for compatible with other EFS materials, complying with ASTM D 578 and as follows:

Joint Mesh (at cement-board joints, corners at openings, and surface-mounted accessory-unit flanges): self-adhesive, flexible fabric of not less than 3.75 oz./sq. yd.

Base-Coat Mesh: Not less than 4.5 oz./sq. yd.

Detail Mesh (for aesthetic details, or as an alternative to joint-mesh above): Not less than 4.2 oz./sq. yd.

Corner Mat (at all inside or outside corners): Pre-creased, heavy-duty fabric of not less than 7.8 oz./sq. yd.

EFS BASE-COAT: Manufacturer's standard one-component, polymer-modified, cement-based, factory blended base-coat formulation with less than 33 percent Portland cement content by weight.

PRIMER: EFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.

FINISH COATING: EFS Manufacturer's standard acrylic-based, factory-mixed textured-finish coating with integral-color and graded marble aggregates, compounded with improved resistance to dirt-pick up. Provide colors indicated on the Drawings, with no additional cost for “special-colors” or for “color-matching.”

PART 3 – EXECUTION

EXAMINE adjacent Work for verification of installation tolerances and for compliance with other requirements and conditions affecting installation. Verify critical dimensions, and examine supporting structure and other conditions under which the Work of this Section is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

EXAMINE SUBSTRATES to determine if they are in satisfactory condition for installation of EFS system. Do not proceed with installation until unsatisfactory conditions have been corrected.

2 PROTECT ADJACENT WORK from moisture deterioration and soiling resulting from application of system.
Provide temporary coverings and other protection needed to prevent spattering of exterior finish coatings on other
4 work.

6 PROTECT SYSTEM components from inclement weather during installation. Prevent infiltration of moisture
behind system and deterioration of substrates.

8 PREPARE AND CLEAN substrates to comply with system manufacturer's requirements.

10 FASTENING TO IN-PLACE CONSTRUCTION: Provide anchorages and fasteners where necessary for securing
the Work of this Section to in-place construction. Provide threaded fasteners for concrete and masonry inserts,
12 toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as appropriate.

14 CUTTING, FITTING, AND PLACEMENT: Perform cutting, drilling, and fitting required for installing the work of
this Section. Set units accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true,
16 and free of rack; and measured from established lines and levels. Provide temporary bracing or anchors in formwork
for items that are to be built into concrete, masonry, or similar construction.

18 INSTALL EFS system in accordance with written installation requirements of the manufacturer, and as follows:

20 **INSTALLATION OF STARTER-TRACK & BACK-MOUNT CASING BEADS:**

22 PROVIDE ADDITIONAL METAL STRAPPING between substrate framing and at other locations where
24 fasteners for back-mounted accessory-trim are required to be located

26 INSTALL BACK-MOUNTED CASING BEADS at cement-board soffit perimeters, unless soffit is
indicated to extend into openings above windows or doors. Attach with fasteners to framing at 16" OC
28 minimum. Butt separate sections of track and casing units together typically. Miter-cut outside corners and
abut. Snip front-flange of one inside-corner unit to clear adjacent unit (to allow cement-board to be seated
30 inside) and abut.

32 **CEMENT-BOARD INSTALLATION:**

34 STAGGER CEMENT-BOARD JOINTS by 24 inch minimum from adjacent joints.

36 ATTACH BOARDS by inserting anchoring into framing members spaced at 16" OC maximum with
fasteners spaced at 8" OC both at perimeter and in the field of the boards. Install boards with end and edges
38 closely butted, but not forced together. Cut boards around light fixtures or other accessories, as
appropriate.

40 APPLY JOINT SEALANT between cement-boards at all control-joints, per requirements of Division-07
42 Section "Joint Sealants".

44 **SURFACE-MOUNTED ACCESSORY TRIM INSTALLATION:**

46 INSTALL CASING-BEADS at all CBS terminations.

48 INSTALL ONE (1)-PIECE CONTROL-JOINTS at intervals of 25 ft maximum in each direction with
length/width ratio not to exceed 2-1/2:1, and with a maximum allowable area without a control-joint of 625
50 square-feet. Abut intersecting control-joint accessories where occurs.

52 INSTALL FULL-LENGTH accessory-trim units typically, avoiding short-length sections.

54 **JOINT REINFORCEMENT INSTALLATION:**

56 AT CEMENT-BOARD JOINTS, center a 4 inch minimum width of self-adhesive joint-mesh – overlapping
58 mesh seams a minimum of 2-1/2 inches.

60 **MESH & BASE-COAT APPLICATION:**

62 **DETAIL MESH APPLICATION:** At all soffit penetrations, apply minimum 9x12 inch diagonal strips of
detail mesh. Embed detail mesh in the wet base coat. Trowel from the center to the edges of the mesh to
64 avoid wrinkles, and trowel from the base of reveals to the edge of the mesh.

66 **INSTALL REINFORCING MESH** by applying base coat over the cement-board with a trowel. Work in
strips of 40 inches, and immediately embed the mesh into the wet base coat by troweling from the center to
68 the edge of the mesh. Overlap mesh not less than 2-1/2 inches at mesh seams and at overlaps of detail
mesh. Feather seams and edges with base-coat. Avoid wrinkles in the mesh. Allow the base coat to dry.

2 APPLY BASE-COAT over the reinforcing mesh surfaces with a trowel to a uniform overall thickness of
4 approximately 1/8 inch minimum. The mesh must be fully embedded so that no mesh color shows through
6 the base coat when it is dry. Re-skim with additional base-coat if mesh color is visible or if necessary to
8 correct planar irregularities in the wall surface. Allow base coat to thoroughly dry before applying finish.

FINISH COAT APPLICATION

8 APPLY PRIMER over dry base coat according to EFS manufacturer's written instructions.

10 APPLY FINISH COAT using sufficient manpower and equipment to insure a continuous operation without
12 cold joints or irregularities. Install finish-coat directly over base coat when dry. Apply by troweling only,
14 matching texture and finish color of the approved sample, if applicable. Avoid application in direct
16 sunlight. Apply finish in a continuous application, and work to a break in the wall. Apply finish only onto
18 outside face of exterior walls.

16 DO NOT INSTALL separate batches of finish side-by-side. Do not apply finish into or over sealant joints.
18 Do not apply finish over irregular or unprepared surfaces, or surfaces not in compliance with the
20 requirements of the Specifications.

20 CLEAN UP debris resulting from installation of the EFS system. Protect from damage by other trades, until the
22 project is Substantially Complete.

END OF SECTION 07 24 10

PART 1 - GENERAL

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RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

WORK INCLUDED: Provide water-drainage type Exterior Insulation and Finish System (EIFS) where indicated on the Drawings, as specified herein, and as necessary for complete installation.

EIFS may be applied over the following substrates:

- Concrete and masonry surfaces
- Glass-mat gypsum sheathing.
- Plywood sheathing.

RELATED SECTIONS include the following:

- Division 6 Section "Sheathing" for sheathing substrates
- Division 7 Section "Joint Sealants" for sealing joints in EIFS with elastomeric joint sealants.

SUBMITTALS

SUBMIT PRODUCT DATA for each type and component of EIFS indicated. Include typical details of components, details of penetration and terminations, flashing details, joint configurations, and attachments to other work, including mechanical anchors.

SAMPLES FOR VERIFICATION: Twelve (12) inch square panels for each type of finish-coat color and texture indicated, prepared using same tools and techniques intended for actual work including an aesthetic reveal, a typical control joint filled with sealant of color selected.

LIST OF MOCKUP MATERIALS: List manufacturer’s product/color names, finishes, and other information as required to identify materials used. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.

MAINTENANCE DATA: For EIFS to include in maintenance manuals.

SUBMIT REPORTS by the local, EIFS manufacturer’s representative of the pre-installation conference and installation “observation reports” at the following stages of Work progress (4 site visits total):
At start of “board installation”
At start of “base-coat installation”, and
At start of “finish coat installation”

QUALITY ASSURANCE

INSTALLER QUALIFICATIONS: An installer with a minimum of 5 years demonstrable experience in installation of EIFS systems by the manufacturer utilized. Installer's responsibilities include furnishing skilled technicians specifically trained and experienced with application of the EIFS.

SOURCE LIMITATIONS: Obtain EIFS through one source from a single EIFS manufacturer or from sources approved in writing by EIFS manufacturer as compatible with system components.

MOCKUP:

PROVIDE MATERIALS for construction of a field mockup of each different color and finish indicated, showing the full range of exposed textures and dimensions of trim or special effects to be expected in the completed construction.

BEFORE INSTALLING the Work of this Section, build mockup to verify selections made under sample Submittals and to demonstrate aesthetic effects. Refer to Division-1 Section “Project Materials Mockup” for requirements.

PROVIDE SAMPLES on mockup for each type of EIFS finish indicated. Duplicate finish of approved sample submittals. Apply mockup samples according to requirements for the completed Work. Provide required sheen, color, and texture on each surface. Approved mockup sample finishes will be used to evaluate coatings installed on project. Final approval of colors and textures will be from mockup samples - obtain Architect's approval of mockup samples before starting application of coatings.

2 DELIVERY, STORAGE, AND HANDLING

4 DELIVER MATERIALS in original, unopened packages with manufacturers' labels intact and clearly identifying products.

6 STORE MATERIALS INSIDE AND UNDER COVER; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes. Stack insulation board flat and off the ground. Protect plastic insulation against ignition at all times. Do not deliver plastic insulating materials to Project site before installation time. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

14 PROJECT CONDITIONS

16 WEATHER LIMITATIONS: Maintain ambient temperatures above 40 deg F for a minimum of 24 hours before, during, and after adhesives or coatings are applied. Do not apply EIFS adhesives or coatings during rainfall. Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.

22 COORDINATION

24 CONDUCT A PRE-INSTALLATION CONFERENCE with the manufacturer’s local representative at the Project Site to review substrate requirements, field conditions, critical details of installation, overall project scheduling, and timing of subsequent manufacturer representative’s site observations.

28 COORDINATE INSTALLATION OF EIFS WITH RELATED WORK specified in other Sections to ensure that wall assemblies, including sheathing, flashing, trim, joint sealants, windows, and doors, are protected against damage from the effects of weather, age, corrosion, moisture, and other causes.

32 COORDINATE INSTALLATION of air-barrier components with other trades to provide a continuous air-tight membrane.

34 COORDINATE INSTALLATION OF FLASHING and other moisture protection with other trades to achieve complete moisture protection so that water is directed to the exterior (not into the wall assembly) and drained to the exterior at sources of leaks, at all windows, doors and other penetrations through the wall assembly.

40 WARRANTEE:

42 MANUFACTURER'S WARRANTEE: Provide EIF system manufacturer's ten (10) year limited warrantee to supply replacement materials for any materials shown to be defective when originally supplied.

46 **PART 2 - PRODUCTS**

48 SYSTEM DESCRIPTION: Class PB drainable EIFS consisting of a single layer of insulation board secured typically with vertical adhesive strips forming a drainage plane behind the insulation, with a finish over the insulation board of open-weave mesh embedded in primer/adhesive, with an acrylic-based surface coating as defined by ASTM C 1397.

52 PRODUCT / MANUFACTURER: This specification is based on the following finish and insulation system:
54 “StoTherm ci Classic” as manufactured by "STO Corporation".
56 “Outsulation Plus MD” as manufactured by “Dryvit systems, Inc.”, or
TeifsAirtight, as manufactured by Parexusa

58 EQUIVALENT PRODUCTS: Subject to compliance with requirements, equivalent products of the following manufacturers are also acceptable:
60 Senergy Inc.; SKW-MBT Construction Chemicals.

62 OTHER MANUFACTURERS may be proposed only as a substitution request as required in Division-1 Sections.

64

MATERIALS

COMPATIBILITY: Provide substrates, water-/weather-resistive barriers, adhesive, fasteners, board insulation, reinforcing meshes, base- and finish-coat systems, sealants, and accessories that are compatible with one another and approved for use by EIFS manufacturer for Project.

COLORS, TEXTURES, AND PATTERNS OF FINISH COAT: As selected by Architect from manufacturer's full range. Provide the quantity of different colors and textures as indicated within the color/materials schedule in the Drawings, or if not indicated, provide up to three (3) different colors and textures throughout project with no additional cost for "special colors" or "color matching".

COLOR MATCHING OF FINISH COAT: Color match specified "paint-colors" as specified by Architect with no additional cost for "special colors" or "color matching". Provide the quantity of different colors and textures as indicated within the color/materials schedule in the Drawings, or if not indicated, provide up to three (3) different colors and textures throughout project.

WATER: Clear and potable.

INSULATION ADHESIVE: EIFS manufacturer's standard formulation designed for indicated use, compatible with substrate. Provide one-component, polymer-modified, cement based, factory blend, material with less than 33 percent Portland cement content.

Dryvit "Primus DM" (dry-mix), or
"Sto – Primer Adhesive B (PAB) or equal

INSULATION: Nominal 1.0 PCF, expanded polystyrene boards, 1-1/2 –inch thickness typical x 2' x 4' maximum size, with flame spread and smoke development 25 and 450 respectively in accordance with ASTM E 84. Comply with ASTM C 578 Type I requirements, and EIMA Guideline Specification for Expanded Polystyrene (EPS) Insulation Board

PROVIDE PRE-WRAPPED EDGE BOARDS: with mesh and base coat at all starter, termination or similar edge conditions (no exceptions).

FOAM TRIM: Provide in profile(s) and locations as indicated in the Drawings. Provide ASTM C 578 Type I expanded polystyrene units of nominal 1.0 PCF, aged six (6) weeks minimum, meeting flame-spread and smoke-development of 25 and 450 respectively per ASTM E 84. Fabricate by cutting with hot-wire or provide special molded units. Provide units pre-coated with polymer-modified cementitious base-coat and reinforcing mesh typically. Hold base-coat back at ends to receive mesh from adjacent unit at joints in continuous runs of foam trim. Provide base-coat and reinforcing at ends of all units abutting control joints. Acceptable manufactures include but are not limited to:

Driangle Inc
Hopper
Iowa EPS or equal

MECHANICAL FASTENERS: EIFS manufacturer's standard corrosion-resistant fasteners consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; selected for properties of pullout, tensile, and shear strength required to resist design loads of application indicated; capable of pulling fastener head below surface of insulation board; and of the following description:

- For attachment to steel studs from 0.033 to 0.112 inch in thickness, provide steel drill screws complying with ASTM C 954.
- For attachment to light-gage steel framing members not less than 0.0179 inch in thickness, provide steel drill screws complying with ASTM C 1002.
- For attachment to wood framing members and plywood sheathing, provide steel drill screws complying with ASTM C 1002, Type W.
- For attachment to masonry and concrete substrates, provide sheathing dowel in form of a plastic wing-tipped fastener with thermal cap, sized to fit insulation thickness indicated and to penetrate substrate to depth required to secure anchorage.

REINFORCING MESH: Balanced, alkali-resistant, open-weave glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. per EIMA 105.01, complying with ASTM D 578 and the following requirements for minimum weight:

- Typical Base Coat Reinforcing Mesh: Not less than 4.3 oz./sq. yd.
- Impact-resistant (intermediate duty) Reinforcing Mesh: Not less than 11 oz./sq. yd.
- High-impact Base Coat Reinforcing Mesh: Not less than 15 oz./sq. yd.
- Substrate Joint Reinforcing Mesh: Not less than 3.75 oz./sq. yd., in minimum widths as follows:
 - Four (4) inch at substrate sheathing joints
 - Nine (9) inch at all rough openings, corners and tops of parapets.
- Base Coat Detail Reinforcing Mesh: Not less than 4.2 oz./sq. yd.
- Base Coat Corner Reinforcing Mesh: Not less than 7.2 oz./sq. yd.

2 TYPICAL BASE-COAT MATERIAL: EIFS manufacturer's standard one-component, polymer-modified, cement
based, factory blended formulation with less than 33 percent Portland cement content, designed for indicated use
and compatible with substrate. Tint to match color of finish coat material. Acceptable products include:

4 Dryvit "Primus DM", or

6 "Sto – Primer Adhesive-B (PAB)" or equal

8 WATERPROOF BASE COAT: Manufacturer's standard, waterproof factory blended, acrylic based two component
fiber reinforced flexible material with less than 33 percent Portland cement complying with ASTM C 150 Type 1:

10 Dryvit "Dryflex"

12 "Sto Flexyl" or equal

14 PRIMER: Manufacturer's standard factory-mixed elastomeric-polymer primer for preparing base-coat surface for
application of finish coat – tinted to match color of finish coat:

16 Dryvit "Genesis"

"Sto Primer" or equal

18 FINISH-COAT MATERIALS: Manufacturer's standard acrylic-based factory mixed formulation of polymer-
emulsion binder, integral colorfast pigments, sound, graded marble aggregates, and fillers, with waterproof clear
acrylic based sealer for protecting finish coat:

20 Dryvit "DPR Sandblast" - Medium Texture finish

22 "Sto Essence DPR" – # 306 Medium Sand texture finish or equal

24 MIXING

26 COMPLY WITH EIFS MANUFACTURER'S REQUIREMENTS for combining and mixing materials. Do not
28 introduce admixtures, water, or other materials except as recommended by EIFS manufacturer. Mix materials in
clean containers. Use materials within time period specified by EIFS manufacturer or discard.

30 PART 3 - EXECUTION

32 EXAMINATION

34 EXAMINE SUBSTRATES, areas, and conditions, with Installer present, for compliance with requirements for
36 installation tolerances and other conditions affecting performance of EIFS.

38 EXAMINE ROOF EDGES, wall framing, flashings, openings, substrates, and junctures at other construction for
suitable conditions where EIFS will be installed.

40 PROCEED WITH INSTALLATION only after unsatisfactory conditions have been corrected.

44 PREPARATION

46 PROTECT CONTIGUOUS WORK from moisture deterioration and soiling caused by application of EIFS. Provide
temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.

48 PROTECT EIFS, SUBSTRATES, AND WALL CONSTRUCTION behind them from inclement weather during
50 installation. Prevent penetration of moisture behind EIFS and deterioration of substrates.

52 PREPARE AND CLEAN SUBSTRATES to comply with EIFS manufacturer's written requirements to obtain
optimum bond between substrate and adhesive for insulation. Provide clean, dry, neutral-pH substrate for insulation
54 installation. Verify suitability of substrate by performing bond and moisture tests recommended by EIFS
56 manufacturer.

58 INSTALLATION OF INSULATION:

60 COMPLY WITH ASTM C 1397 and EIFS manufacturer's written instructions for installation of EIFS as applicable
to each type of substrate indicated.

62 APPLY INSULATION OVER DRY SUBSTRATES in courses with long edges of boards oriented horizontally.
64 Begin first course of insulation from a level base line and work upward. Work from perimeter toward interior of
panels if possible.

66 USE PRE-WRAPPED EDGE BOARDS at all EIFS edges, expansion joints or terminations (vinyl edge trim is not
68 acceptable). Form joints for sealant application with pre-wrapped edge boards for joints within EIFS and at

2 dissimilar adjoining surfaces. Make sealed perimeter joints between pre-wrapped edge boards and adjacent surfaces
3 of minimum 3/8" thickness or larger as noted.

4 STAGGER VERTICAL JOINTS OF INSULATION BOARDS in successive courses to produce running bond
5 pattern. Locate joints so no piece of insulation is less than 12 inches wide or 6 inches high. Offset joints not less than
6 6 inches from corners of window and door openings and not less than 4 inches from aesthetic reveals. Offset joints
7 of insulation not less than 6 inches from horizontal and 4 inches from vertical joints in sheathing.

8 CUT INSULATION TO FIT openings, corners, and projections precisely and to produce edges and shapes
9 complying with details indicated.

12 ADHESIVELY ATTACH insulation by applying uniform ribbons of adhesive with the manufacturer's approved
13 notched trowel in compliance with ASTM C 1397. Apply to the back side of insulation boards parallel with the short
14 dimension of the board so that when boards are placed on the wall the ribbons will be vertical. Immediately place
15 insulation boards in a running bond pattern on the wall with the long dimension horizontal. Apply firm pressure over
16 the entire surface of the boards to ensure uniform contact of adhesive. Interlock inside and outside corners. Butt all
17 board joints tightly together to eliminate any thermal breaks in the EIFS, without adhesive between the board joints.

18 VERIFY CONTACT of adhesive by removing individual boards periodically while the adhesive is still wet. An
19 equal amount of adhesive must be on the substrate and the board when they are removed, as an indication of
20 adequate adhesion.

22 FEATURES AND TRIM: Attach build-up trim elements where designated on drawings with adhesive to the
23 insulation board or sheathing surface. Cut reveals/aesthetic grooves with a hot-knife, router or groove-tool in
24 locations indicated on drawings, leaving not less than 3/4 inch foam substrate. Slope top surface of all trim/features
25 and the bottom of all horizontal reveals to a minimum slope of 1:2 (27 degrees).

28 **INSTALL FOAM SHAPES attached to supporting substrate with adhesive.**

30 SUPPLEMENT ADHESIVE WITH MECHANICAL ATTACHMENT at small areas and other locations where
31 adhesive attachment is not sufficient for secure bonding, by methods complying with EIFS manufacturer's written
32 requirements Do not use any non-thermal type nails or screws. Install top surface of fastener heads flush with plane
33 of insulation. Install fasteners into or through substrates with the following minimum penetration:

34 Steel Framing: 5/16 inch
35 Wood Framing: 1 inch
36 Concrete and Masonry: 1 inch

38 **MECHANICALLY ATTACH all insulation boards mounted over fire-retardant treated plywood, using four (4)
39 anchors per board minimum.**

42 **MECHANICALLY ATTACH all insulation boards mounted below glass-mat gypsum soffits.**

44 FILL ALL OPEN JOINTS over 1/16 inch thick after insulation boards are firmly adhered with slivers of insulation
45 or low-expanding spray foam approved for use by EIFS manufacturer.

46 SAND HIGH AREAS of insulation board surface with a rasp to be smooth and even, and to remove any ultraviolet
47 ray damage.

48 RASP OR SAND FLUSH ENTIRE SURFACE OF INSULATION to remove irregularities projecting more than
49 1/32 inch from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions
50 deeper than 1/16 inch. Cut aesthetic reveals in outside face of insulation with high-speed router and bit configured
51 to produce grooves, rabbets, and other features that comply with profiles and locations indicated. Do not reduce
52 insulation thickness at aesthetic reveals to less than 3/4 inch.

54 PROVIDE EIFS EXPANSION JOINTS where required by EIFS manufacturer, and as follows:

55 Where expansion joints are indicated in substrates behind EIFS.
56 Where EIFS adjoin dissimilar substrates, materials, and construction.
57 Where wall height changes.

60 MESH & BASE COAT APPLICATION:

62 DETAIL MESH APPLICATION: At corners of windows, doors and all finish system penetrations, apply minimum
63 9x12 inch diagonal strips of detail mesh, and continuous sections at trim, reveals and projecting features. Embed
64 detail mesh in the wet base coat. Trowel from the center to the edges of the mesh to avoid wrinkles, and trowel from
65 the base of reveals to the edge of the mesh.

68 AT SLOPED SURFACES of trim, reveals, aesthetic bands, cornice profiles, sills or other features that project
beyond the vertical wall plane more than 2 inches, apply waterproof base coat with a trowel to the weather exposed

sloped surface and minimum four (4) inches above and below. Embed standard mesh in the waterproof base coat and overlap mesh seams a minimum of 2-1/2 inches as indicated below.

INSTALL IMPACT-RESISTANT MESH at all conditions **on exterior wall surfaces within SIX (6) feet of finish grade**, terminating at the next higher EIFS joint or detail as applicable. Butt high-impact mesh at seams. When the basecoat is completely dry over the high-impact mesh, apply one layer of standard mesh and basecoat over the high-impact mesh as indicated below.

INSTALL MESH by applying a single base coat over the insulation board with a trowel to a uniform thickness of approximately 1/8 inch. Work horizontally or vertically in strips of 40 inches, and immediately embed the mesh into the wet base coat by troweling from the center to the edge of the mesh. Butt the mesh at seams. Allow the base coat to dry. Overlap mesh not less than 2-1/2 inches at mesh seams and at overlaps of detail mesh. Feather seams and edges. Double wrap all inside and outside corners with minimum 2-1/2 inch overlap in each direction. Avoid wrinkles in the mesh. The mesh must be fully embedded so that no mesh color shows through the base coat when it is dry. Re-skim with additional base coat if mesh color is visible. Allow base coat to thoroughly dry before application of finish coat.

FINISH COAT APPLICATION

APPLY PRIMER over dry base coat according to EIFS manufacturer's written instructions.

APPLY FINISH COAT using sufficient manpower and equipment to insure a continuous operation without cold joints, shadow lines, textural variations or other irregularities. Install finish coat directly over base coat when dry in thickness required by EIFS manufacturer to produce a uniform finish of color and texture. Apply by spraying or troweling depending on the finish texture required, and match texture and finish color of approved sample. Avoid application in direct sunlight. Apply finish in a continuous application, maintaining a wed edge at all times for uniform appearance, and work to a break in the wall.

DO NOT INSTALL separate batches of finish side-by-side. Do not apply finish into or over sealant joints. Do not apply finish over irregular or unprepared surfaces, or surfaces not in compliance with the requirements of the project specifications.

SEALER COAT: Apply over dry finish coat, in number of coats and thickness required by EIFS manufacturer.

INSTALLATION OF EIFS JOINT SEALANTS

PREPARE JOINTS AND APPLY SEALANTS, of type and at locations indicated, to comply with applicable requirements in Division 7 Section "Joint Sealants" and in EIMA's "EIMA Guide for Use of Sealants with Exterior Insulation and Finish Systems, Class PB."

Clean surfaces to receive sealants to comply with indicated requirements and EIFS manufacturer's written instructions.

Apply primer recommended in writing by sealant manufacturer for surfaces to be sealed.

Install sealant backing to control depth and configuration of sealant joint and to prevent sealant from adhering to back of joint.

Apply masking tape to protect areas adjacent to sealant joints. Remove tape immediately after tooling joints, without disturbing joint seal.

Recess sealant sufficiently from surface of EIFS so an additional sealant application, including cylindrical sealant backing, can be installed without protruding beyond EIFS surface.

Apply joint sealants after base coat has cured but before applying finish coat.

CLEANING AND PROTECTION

REMOVE TEMPORARY COVERING and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.

PROVIDE FINAL PROTECTION and maintain conditions, in a manner acceptable to Installer and EIFS manufacturer, that ensure that EIFS are without damage or deterioration at time of Substantial Completion.

END OF SECTION 07 24 19

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide a fluid-applied, vapor-permeable, weather-resistant moisture barrier system over all
exterior sheathing (both gypsum or wood based), as specified herein, and as necessary for complete installation. The
8 Work of this Section includes:
Application over all sheathing (wood or gypsum), with WRB-flashing treatment at rough-openings,
10 penetrations and sheathing joints

12 RELATED SECTIONS include the following:
Division-06 Section "Sheathing" for sheathing substrates
14 Division-07 Section "Water Drainage EIFS" for compatible insulation and exposed finish coating
Division-07 Section "Sheet Metal Flashing and Trim" for sheet metal flashings
16 Division-07 Section "Joint Sealants" for joint sealant materials and installation

18 PERFORMANCE REQUIREMENTS: Provide a weather-resistant barrier capable of performing as a continuous
vapor-permeable air barrier, and as a liquid-water drainage plane flashed to discharge to the exterior incidental
20 condensation or water penetration. The system shall be capable of accommodating substrate movement and of
sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions
22 without deterioration or air leakage not to exceed 0.02 CFM per square foot of surface area at 1.57 lbf/sq. ft. per
ASTM E 283.

24 SUBMIT PRODUCT DATA for each component of the weather-resistant barrier indicated.

26
28 **DELIVERY, STORAGE, AND HANDLING**

30 DELIVER MATERIALS in original, unopened packages with manufacturers' labels intact and clearly identifying
products.

32 STORE MATERIALS INSIDE AND UNDER COVER; keep them dry and protected from weather, direct sunlight,
34 surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes. Stack
insulation board flat and off the ground. Protect plastic insulation against ignition at all times. Do not deliver plastic
36 insulating materials to Project site before installation time. Complete installation and concealment of plastic
materials as rapidly as possible in each area of construction.

40 **PROJECT CONDITIONS**

42 WEATHER LIMITATIONS: Maintain ambient temperatures above 40 deg F for a minimum of 24 hours before,
during, and after coatings are applied. Do not apply air-moisture barrier coating during rainfall. Proceed with
44 installation only when existing and forecasted weather conditions and ambient outdoor air and substrate
temperatures permit materials to be applied, dried, and cured according to manufacturers' written instructions and
46 warranty requirements.

48 **COORDINATION**

50 COORDINATE INSTALLATION of air-barrier components with other trades to provide a continuous air-tight
52 membrane.

54 COMPATIBILITY: Provide materials that are compatible with one another and approved for use by EIFS or plaster
system manufacturer for Project.

56
58 **PART 2 - PRODUCTS**

60 PRODUCT / MANUFACTURER: This specification is based on products manufactured by one of the following:
Dryvit Systems Inc.
62 Tremco
STO.
Senergy Inc.; SKW-MBT Construction Chemicals.

64 OTHER MANUFACTURERS may be proposed only as a substitution request as required in Division-1 Sections.

WEATHER-RESISTANT BARRIER: Provide manufacture’s substrate air and moisture barrier designed to seal substrates from moisture penetration, including the following components:

ACRYLIC JOINT FILLER: or equal ready-mixed, acrylic based material flexible joint compound.

Dryvit’s “Backstop NTX Texture” or Tremco’s “Dymonic 100” or “Sto Gold Fill” or equal

ACRYLIC WATERPROOF COATING: ready-mixed, acrylic based waterproofing coating material:

Dryvit’s “Backstop NTX Smooth” or Tremco’s “Exoair 230” or “Sto Gold Guard” or equal

SUBSTRATE JOINT REINFORCEMENT: Nominal 4.2 oz/sq. yd. self-adhesive, flexible, symmetrical, interlaced glass fiber fabric, with alkaline resistant coating compatible with other materials:

Dryvit “Grid Tape” or “Sto Guard Mesh” or equal

WATER: Clear and potable.

AUXILIARY MATERIALS

PROVIDE AUXILIARY MATERIALS recommended by air-moisture barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

PRIMER: Liquid waterborne or solvent-borne primer recommended for substrate by manufacturer of air barrier material.

COUNTERFLASHING STRIP: Modified bituminous, 40-mil-thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil-thick, crosslaminated polyethylene film with release liner backing.

ADHESIVE AND TAPE: Air barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.

SPRAYED POLYURETHANE FOAM SEALANT: 1- or 2-component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft density; flame spread index of 25 or less according to ASTM E 162; with primer and non-corrosive substrate cleaner recommended by foam sealant manufacturer

MODIFIED BITUMINOUS TRANSITION STRIP: Vapor-retarding, 40-mil-thick, smooth-surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil-thick polyethylene film with release liner backing.

JOINT SEALANT: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low-modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Division 07 Section "Joint Sealants.

MIXING

COMPLY WITH MANUFACTURER'S REQUIREMENTS for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by manufacturer. Mix materials in clean containers. Use materials within time period specified by manufacturer or discard.

PART 3 - EXECUTION

EXAMINE SUBSTRATES, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of air-moisture barrier coating.

EXAMINE ROOF EDGES, wall framing, flashings, openings, substrates, and junctures at other construction for suitable conditions where materials will be installed.

VERIFY that concrete has cured and aged for minimum time period recommended by air barrier manufacturer. Verify that concrete is visibly dry and free of moisture.

VERIFY that masonry joints are flush and completely filled with mortar.

PROCEED WITH INSTALLATION only after unsatisfactory conditions have been corrected.

PROTECT CONTIGUOUS WORK from moisture deterioration and soiling caused by application of air-moisture barrier. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.

PROTECT SUBSTRATES AND WALL CONSTRUCTION behind them from inclement weather during installation. Prevent penetration of moisture behind sheathing and deterioration of substrates.

SURFACE PREPARATION

2 CLEAN, PREPARE, TREAT, AND SEAL SUBSTRATE according to manufacturer's written instructions. Provide
4 clean, dust-free, and dry substrate for air barrier application. Remove grease, oil, bitumen, form-release agents,
6 paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

8 AT CHANGES IN SUBSTRATE PLANE, apply joint-filler with reinforcing mesh at sharp corners and edges to
form a smooth transition from one plane to another.

10 COVER GAPS IN SUBSTRATE PLANE and form a smooth transition from one substrate plane to another with
12 joint-filler and reinforcing mesh to provide continuous support for the air barrier.

TRANSITION STRIP INSTALLATION

14 INSTALL TRANSITION STRIPS, AND AUXILIARY MATERIALS according to air barrier manufacturer's
16 written instructions to form a seal with adjacent construction and maintain a continuous air barrier. Coordinate the
18 installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier.

20 INSTALL COUNTER-FLASHING STRIP on roofing membrane or base flashing so that a minimum of 3 inches of
22 coverage is achieved over both substrates.

24 APPLY PRIMER TO SUBSTRATES at required rate and allow to dry. Limit priming to areas that will be covered
26 by air barrier sheet in same day. Reprime areas exposed for more than 24 hours. Prime glass-fiber-surfaced gypsum
sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.

28 CONNECT AND SEAL EXTERIOR WALL WEATHER-RESISTANT BARRIER MEMBRANE continuously to
30 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.

32 APPLY JOINT SEALANTS forming part of air barrier assembly within manufacturer's recommended application
34 temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

36 AT WALL OPENINGS, prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, and
38 doors. Apply transition strip so that a minimum of 3 inches of coverage is achieved over both substrates. Maintain 3
inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact. Roll firmly to
enhance adhesion.

40 FILL GAPS IN PERIMETER FRAME SURFACES of windows, curtain walls, storefronts, and doors, and
42 miscellaneous penetrations of air barrier membrane with foam sealant.

44 SEAL TOP OF THROUGH-WALL FLASHINGS to air barrier with an additional 6-inch-wide transition strip. Seal
46 exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or
48 ending in reglets with termination mastic. 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.

JOINT TREATMENT

52 SHEATHING SUBSTRATES: Fill joints greater than 1/4 inch with sealant according to air barrier manufacturer's
54 written instructions. Tape and seal all joints, exposed edges, terminations, and inside and outside corners of
sheathing, unless otherwise indicated by manufacturer's written instructions.

56 APPLY JOINT FILLER with reinforcing mesh at all rough-openings in substrate sheathing, at all joints and
58 penetrations in substrate sheathing (including joints between dissimilar sheathing materials), and at all inside- or
outside-corners of substrate sheathing. Place 4 inch wide (minimum) reinforcing-mesh at all sheathing joints and 9
60 inch wide (minimum) mesh at all rough openings, inside and outside corners. Immediately apply joint-filler by spray
or trowel over the mesh and trowel smooth. Protect from rain and freezing until dry.

62 Optional: Tremco Dymonic 100 Sealant – No mesh required. Sealant to be applied and spread on joints,
screw heads and rough openings. Sealant can bridge a gap up to 1/4" without use of backer rod.

64 SPOT-TROWEL all sheathing fasteners, knots, or other voids in sheathing surface wi

66 AIR - MOISTURE BARRIER INSTALLATION:
68

2 APPLY AIR-MOISTURE BARRIER over substrates to protect from degradation and to provide a water-weather-
resistive barrier coating. Apply to form a membrane seal with strips and transition strips and to achieve a continuous
air barrier according to air barrier manufacturer's written instructions.

4
6 APPLY ACRYLIC WATERPROOF COATING over all sheathing after joint-filler is dry. Extend up and over wood
blocking at top of all parapets (to be subsequently covered with roofing membrane). Apply with spray equipment or
a roller in compliance with manufacturer's recommendations, providing a uniform wet thickness of 10 mils
8 minimum in one single coating. Inspect sheathing surface after application for discontinuities that may be caused by
swelling of individual wood strands in OSB or plywood sheathing, and touch up as necessary to provide a
10 continuous void-free coating. Protect from weather until dry:

12 Application over glass-mat gypsum or OSB sheathing: use 3/4" nap roller

Application over plywood: Use a 1/2" nap roller.

14 APPLY TRANSITION STRIPS over cured air membrane overlapping 3 inches onto each surface according to air
barrier manufacturer's written instructions.

16 CORRECT DEFICIENCIES IN OR REMOVE AIR BARRIER that does not comply with requirements; repair
18 substrates and reapply air barrier components.

20 **END OF SECTION 07 24 19**

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide metal-panels where indicated on the Drawings, as specified herein, and as necessary
for complete installation. Types of applications include but are not limited to the following:
8 Factory-formed and field-assembled, concealed-fastener, lap-seam metal wall and soffit panels

10 RELATED SECTIONS include the following:

Division 5 Section "Cold-Formed Metal Framing" for secondary support framing supporting metal-panels.

12 Division 7 Section "Sheet Metal Flashing and Trim" for flashings and other sheet metal work not part of
metal-panel assemblies.

14 Division 7 Section "Joint Sealants" for field-applied sealants not otherwise specified in this Section.

SUBMITTALS

16 PRODUCT DATA: Include construction details, material descriptions, dimensions of individual
18 components and profiles, and finishes for each type of metal-panel and accessory.

20 SHOP DRAWINGS: Show fabrication and installation layouts of metal-panels; details of edge conditions,
joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and
22 accessories; and special details. Distinguish between factory- and field-assembled work.

QUALITY ASSURANCE

24 SOURCE LIMITATIONS: Obtain each type of metal-panel through one source from a single manufacturer.

26 DO NOT MODIFY INTENDED AESTHETIC EFFECTS, as judged solely by Architect, except with Architect's
28 approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

DELIVERY, STORAGE, AND HANDLING

32 DELIVER COMPONENTS, sheets, metal-panels, and other manufactured items so as not to be damaged or
34 deformed. Package metal-panels for protection during transportation and handling.

36 UNLOAD, STORE, AND ERECT metal-panels in a manner to prevent bending, warping, twisting, and surface
38 damage. 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
40 in contact with other materials that might cause staining, denting, or other surface damage. Store metal-panels to
ensure dryness, with positive slope for drainage of water.

42 DO NOT STORE metal-panels in contact with other materials that might cause staining, denting, or other surface
44 damage. Do not allow storage space to exceed 120 deg F.

PROJECT CONDITIONS

48 FIELD MEASUREMENTS: Verify locations of structural members and wall opening dimensions by field
50 measurements before metal-panel fabrication and indicate measurements on Shop Drawings.

52 ESTABLISHED DIMENSIONS: Where field measurements cannot be made without delaying the Work, either
54 establish framing and opening dimensions and proceed with fabricating metal-panels without field measurements, or
allow for field trimming of panels. Coordinate wall construction to ensure that actual building dimensions, locations
of structural members, and openings correspond to established dimensions.

COORDINATION

58 COORDINATE METAL-PANEL ASSEMBLIES with rain drainage work, flashing, trim, and construction of girts,
60 and or studs and other adjoining work to provide a secure, and noncorrosive installation.

WARRANTY

64 SPECIAL WARRANTY: Manufacturer's standard form in which manufacturer agrees to repair or replace
66 components of metal-panel assemblies that fail in materials or workmanship within specified warranty period.
Failures include, but are not limited to, the following:

68 Structural failures, including rupturing, cracking, or puncturing.

Deterioration of metals, metal finishes, and other materials beyond normal weathering.

WARRANTY PERIOD: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

METAL WALL PANELS: Factory-fabricated, rectangular-edged, flush-flat panels formed with an interlocking leg (male/female joint design) from coil-coated aluminum sheet meeting ASTM B 209, alloy as standard with manufacturer and with temper as required to suit forming operations and structural performance required, Finish exposed surfaces with “premium” metallic thermo-cured finish system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604. At concealed finish, apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

Metal thickness: .040 aluminum minimum

Unit size/profile: 1 inch deep x 16 inch wide

Color: “Champagne Metallic”

Basis of Design Product/Manufacturer: “Una-Clad UC-500 Flush Panel System” by Firestone Metal Products or approved equal

METAL SOFFIT PANELS: Same size and finishes as above, except as follows:

Metal thickness: .032 aluminum minimum

VENTILATED METAL SOFFIT PANELS (locate at every fourth soffit panel except as otherwise indicated on the Drawings, same size and finish as above but punched with a pattern of ventilation holes.

ATTACHMENT SYSTEM COMPONENTS: Formed from extruded aluminum or other approved materials compatible with panel facing. Include manufacturer's standard panel stiffeners, panel clips and anchor channels as appropriate.

PANEL SEALANTS:

JOINT SEALANT: ASTM C 920; elastomeric polyurethane, polysulfide, 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.

MISCELLANEOUS MATERIALS

UNDERLAYMENT: Non-asphaltic fiberglass-based underlayment meeting ASTM D146, D1922 and D4869.

FASTENERS: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal-panels by means of plastic caps or factory-applied coating.

Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head – 5/8” min.

Blind Fasteners: High-strength aluminum or stainless-steel rivets.

BITUMINOUS COATING: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

PANEL ACCESSORIES: Provide components required for a complete metal wall/soffit panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal-panels, unless otherwise indicated.

FABRICATION

FABRICATE METAL-PANELS and accessories at the factory to greatest extent possible, 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.

FORM PANEL LINES, breaks, and angles to be sharp and true, with surfaces free from warp and buckle. Fabricate panels with panel stiffeners as required to maintain fabrication tolerances and to withstand design loads. Fabricate metal-panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.

2 SHEET METAL ACCESSORIES: Fabricate flashing and trim to comply with recommendations in SMACNA's
4 "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item
indicated. 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.

6 SEALED JOINTS: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply
8 with SMACNA standards.

10 CONCEAL FASTENERS and expansion provisions where possible. Exposed fasteners are not allowed on faces of
12 accessories exposed to view. Fabricate cleats and attachment devices from same material as accessory being
anchored or from compatible, noncorrosive metal recommended by metal-panel manufacturer.

14 FINISHES

16 PROTECT MECHANICAL AND PAINTED FINISHES on exposed surfaces from damage by applying a
18 strippable, temporary protective covering before shipping.

20 APPEARANCE OF FINISHED WORK: Variations in appearance of abutting or adjacent pieces are acceptable if
22 they are within one-half of the range of approved Samples. Noticeable variations in the 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.

24 PART 3 - EXECUTION

26 EXAMINE SUBSTRATES, areas, and conditions, with Installer present, for compliance with requirements for
28 installation tolerances, metal-panel supports, and other conditions affecting performance of work.

30 EXAMINE PRIMARY AND SECONDARY WALL FRAMING to verify that girts, angles, channels, studs, and
32 other structural panel support members and anchorage have been installed within alignment tolerances required by
metal-panel manufacturer.

34 EXAMINE ROUGHING-IN for components and systems penetrating metal-panels to verify actual locations of
penetrations relative to joint locations of metal-panels before installation.

36 PROCEED WITH INSTALLATION only after unsatisfactory conditions have been corrected.

38 CLEAN SUBSTRATES of substances harmful to insulation, including removing projections capable of interfering
40 with insulation attachment.

42 INSTALL FLASHINGS and other sheet metal to comply with requirements specified in Division 7 Section "Sheet
Metal Flashing and Trim."

44 MISCELLANEOUS FRAMING: Install subgirts, base angles, sills, furring, and other miscellaneous panel support
46 members and anchorage according to ASTM C 754 and metal-panel manufacturer's written recommendations.

48 INSTALL ATTACHMENT SYSTEM required to support wall and soffit panels and to provide a complete wall and
50 soffit panel system, including subgirts, perimeter trims, tracks, drainage channels, panel clips, and anchor channels.
Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint
seals.

52 METAL-PANEL INSTALLATION, GENERAL

54 INSTALL METAL-PANELS in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular
56 to girts and subgirts, unless otherwise indicated. Anchor metal-panels and other components of the Work securely in
place, with provisions for thermal and structural movement.

58 ALIGN JOINTS between wall and soffit panels, typically.

60 FIELD CUTTING OF METAL-PANELS by torch is not permitted.

62 SHIM OR OTHERWISE PLUMB substrates receiving metal-panels. Rigidly fasten base end of metal-panels and
64 allow eave end free movement due to thermal expansion and contraction. Predrill panels.

66 FLASH AND SEAL METAL-PANELS with weather closures at eaves, rakes, and at perimeter of all openings.
68 Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed
by metal-panels are installed.

2 INSTALL SCREW FASTENERS in predrilled holes. Locate and space fastenings in uniform vertical and horizontal
4 alignment.

6 INSTALL FLASHING AND TRIM as metal-panel work proceeds.

8 LOCATE PANEL SPLICES over, but not attached to, structural supports. Stagger panel spllices and end laps to
10 avoid a four-panel lap splice condition.

12 APPLY ELASTOMERIC SEALANT continuously between metal base channel (sill angle) and concrete, and
14 elsewhere as indicated or, if not indicated, as necessary for waterproofing.

16 ALIGN BOTTOM OF METAL-PANELS and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings
18 and trim around openings and similar elements with self-tapping screws.

20 FASTENERS: Use stainless-steel fasteners for surfaces exposed to the exterior and aluminum or galvanized steel
22 fasteners for surfaces exposed to the interior.

24 METAL PROTECTION: Where dissimilar metals will contact each other or corrosive substrates, protect against
26 galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment
28 to each contact surface, or by other permanent separation as recommended by metal-panel manufacturer.

30 JOINT SEALERS: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof
32 performance of metal-panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated,
34 types recommended by metal-panel manufacturer. Seal metal-panel end laps with double beads of tape or sealant,
full width of panel. Seal side joints where recommended by metal-panel manufacturer.

36 ACCESSORY INSTALLATION

38 INSTALL ACCESSORIES with positive anchorage to building and weathertight mounting and provide for thermal
40 expansion. Coordinate installation with flashings and other components. Install components required for a complete
42 metal-panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure
strips, and similar items.

44 FLASHING AND TRIM: Comply with performance requirements, manufacturer's written installation instructions,
46 and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true
48 to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and
weather resistant. Install exposed flashing and trim that is without excessive oil canning, 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 and weather-resistant performance.

50 EXPANSION PROVISIONS: Provide for thermal expansion of exposed flashing and trim. Space movement joints
52 at a maximum of 10 feet with no joints allowed within 24 inches corner or intersection. Where lapped or bayonet-
54 type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form
56 expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed
within joints).

58 CLEANING AND PROTECTION

60 REMOVE TEMPORARY PROTECTIVE COVERINGS and strippable films, if any, as metal-panels are installed,
62 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.

AFTER METAL-PANEL INSTALLATION, clear weep holes and drainage channels of obstructions, dirt, and
sealant.

REPLACE METAL-PANELS that have been damaged or have deteriorated beyond successful repair by finish
touchup or similar minor repair procedures.

62 END OF SECTION 07 42 13

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide siding panels where indicated on the Drawings, as specified herein, and as necessary
8 for complete installation. Types of applications include but are not limited to the following:
Pre-primed fiber-cement siding panels

10 SUBMIT PRODUCT DATA for all types of Siding and accessories components.

12 DELIVER materials so they will not be damaged. Package for protection against transportation damage. Exercise
14 care in unloading, storing, and erecting materials to prevent bending, warping, twisting, and surface damage.

16 STORE siding materials at site to prevent warping and weather damage, elevating above ground on level blocking
and covering to prevent water damage and to permit adequate ventilation within bundles.

18 PROCEED with siding work only after substrate construction and penetrating work have been completed. Proceed
20 with siding work only when substrate is completely dry.

22 SPECIFIED PRODUCT WARRANTY: Provide siding manufacturer's standard 30 year Limited Transferable
24 Product Warranty on installed work, agreeing to replace defective siding (material only – no labor cost included)
which cracks, rots, delaminates, or fails to resist damage caused by hail or termite attacks due to manufacturing
defects:

PART 2 - PRODUCTS

26 SIDING: "James Hardie" (1-800-9-HARDIE) "HardiShingle" fiber-cement board siding panels, 1/4" nominal
28 thickness x 4 ft wide panels. Provide factory primed units, in following types where indicated on the Drawings:

30 Straight Edge Panel – 16 inch height, for 7 inch exposure
32 Staggered Edge Panel – 16 inch height, for 6 inch exposure
Half-Round Panel – 19 inch height, for 7 inch exposure

34 FELT UNDERLAYMENT: ASTM D 226, 15-lb type.

36 FASTENERS: 0.083" shank x 0.187" head x 1-1/2" long corrosion-resistant siding nails.

PART 3 - EXECUTION

38 COMPLY WITH manufacturers' instructions and recommendations for installation, as applicable to project
40 conditions and supporting substrates. Anchor panels and other components of the work securely in place, with
provisions for thermal and structural movement.

42 UNDERLAYMENT: Apply one layer felt horizontally over entire surface, lapping succeeding courses 2" minimum
44 and fastening with sufficient nails to hold in place until siding application.

46 STARTER COURSE: Install a 1/4" thick lath starter strip at the bottom course of wall. Apply starter course of 10
48 inch "Shingleside" shingles overlapping the starter strip.

50 APPLY SUBSEQUENT COURSES horizontally with a minimum 10 inch overlap at the top and minimum 2 inch
sidelap. The bottom edge of the first two courses overlaps the starter strip.

52 FASTEN between 1/2 to 1 inch vertical clearance between roofing and bottom edge of shingle. Ensure vertical joints
54 of overlapping shingle courses do not align.

56 REPLACE panels and other components of the work that have been damaged or have deteriorated beyond
successful repair by means of finish touch-up or similar minor repair procedures.

58 CLEANING: Upon completion of panel installation, clean finished surfaces as recommended by panel
60 manufacturer, and maintain in a clean condition during construction.

END OF SECTION 07460

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide siding panels where indicated on the Drawings, as specified herein, and as necessary
8 for complete installation. Types of applications include but are not limited to the following:
Pre-primed fiber-cement siding panels

10 SUBMIT PRODUCT DATA for all types of Siding and accessories components.

12 DELIVER materials so they will not be damaged. Package for protection against transportation damage. Exercise
14 care in unloading, storing, and erecting materials to prevent bending, warping, twisting, and surface damage.

16 STORE siding materials at site to prevent warping and weather damage, elevating above ground on level blocking
and covering to prevent water damage and to permit adequate ventilation within bundles.

18 PROCEED with siding work only after substrate construction and penetrating work have been completed. Proceed
20 with siding work only when substrate is completely dry.

22 SPECIFIED PRODUCT WARRANTY: Provide siding manufacturer's standard Limited Transferable Product
Warranty on installed work, agreeing to replace defective siding (material only – no labor cost included) which
24 cracks, rots, delaminates, or fails to resist damage caused by hail or termite attacks due to manufacturing defects for
the following period:

26 Warranty Period: Period of warranty is 30 years after date of substantial completion.

PART 2 - PRODUCTS

28 SHINGLE SIDING: "James Hardie" (1-800-9-HARDIE) "HardiShingle" fiber-cement board siding panels, 1/4"
30 nominal thickness x 4 ft wide panels. Provide factory primed units, in following types where indicated on the
Drawings:

- 32 Straight Edge Panel – 16 inch height, for 7 inch exposure
- 34 Staggered Edge Panel – 16 inch height, for 6 inch exposure
- Half-Round Panel – 19 inch height, for 7 inch exposure

36 SIDING TRIM MEMBERS:

38 "Harditrim MD" Trim units, 7/16" thick x 4", 6", 8", or 12" (Nominal - 3.5", 5.5", 7.5", 11.5" Actual) in
either "Select Cedarmill" textured finish or "Smooth Planks" smooth finish.

40 "Harditrim XLD" Trim units, 1" thick x 4", 6", 8", or 12" (Nominal - 3.5", 5.5", 7.25", 11.25" Actual) in
42 "Smooth Planks" smooth finish.

44 "Harditrim HLD" Trim units, 3/4" thick x 4", 6", 8", or 12" (Nominal - 3.5", 5.5", 7.25", 11.25" Actual) in
46 either "Rustic Grain" textured finish or "Smooth Planks" smooth finish.

48 FELT UNDERLAYMENT: ASTM D 226, 15-lb type.

50 FASTENERS: 0.083" shank x 0.187" head x 1-1/2" long corrosion-resistant siding nails.

PART 3 - EXECUTION

52 INSTALLATION:

54 COMPLY WITH manufacturers' instructions and recommendations for installation, as applicable to project
56 conditions and supporting substrates. Anchor panels and other components of the work securely in place, with
provisions for thermal and structural movement.

58 UNDERLAYMENT: Apply one layer felt horizontally over entire surface, lapping succeeding courses 2" minimum
60 and fastening with sufficient nails to hold in place until siding application.

62 SHINGLE STARTER COURSE: Install a 1/4" thick lath starter strip at the bottom course of wall. Apply starter
64 course of 10 inch shingle units overlapping the starter strip.

2 APPLY SUBSEQUENT SHINGLE COURSES horizontally with a minimum 10 inch overlap at the top and
4 minimum 2 inch sidelap. The bottom edge of the first two courses overlaps the starter strip. Fasten between ½ to 1
inch vertical clearance between roofing and bottom edge of shingle. Ensure vertical joints of overlapping shingle
courses do not align.

6 INSTALL TRIM MEMBERS TRUE AND STRAIGHT with no distortions. Shim as required with concealed shims.
8 Install level and plumb to a tolerance of 1/8 inch in 96 inches. Scribe and cut to fit adjoining work, and refinish cut
surfaces or repair damaged finish at cuts.

10 INSTALL TRIM with minimum number of joints possible, using full- length pieces to the greatest extent possible.
12 Stagger joints in adjacent and related members. Cope at returns, miter at corners, and use scarf joints for end-to-end
joints, to provide tight fitting joints with full surface contact throughout length of joint.

14 ANCHOR TRIM TO ANCHORS OR BLOCKING built in or directly attached to substrates. Secure to grounds,
16 stripping and blocking with countersunk, concealed fasteners and blind nailing. Use fine finishing nails for exposed
nailing, countersunk and filled flush with woodwork.

18 FILL EXPOSED NAIL AND SCREW HOLES with matching filler. Refer to Division 9 Sections for final finishing
20 of installed Work.

22 REPLACE panels and other components of the work that have been damaged or have deteriorated beyond
24 successful repair by means of finish touch-up or similar minor repair procedures. Upon completion of panel
installation, clean finished surfaces as recommended by panel manufacturer, and maintain in a clean condition
during construction.

26 **END OF SECTION 07460**

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide a mechanically fastened, single-ply TPO membrane roofing system, where indicated
8 on the Drawings, as specified herein, and as necessary for complete installation. The Roofing System includes but is
10 not limited to the following:
 Roof insulation, and
 Mechanically-fastened roof membrane

12 RELATED SECTIONS include the following:
14 Division 6 Section Rough Carpentry " for wood nailers, curbs, and blocking. Division 7 Section "Sheet
 Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counterflashings.
16 Division 7 Section "Joint Sealants."
 Division 15 Section "Plumbing Specialties" for roof drains.

18 DEFINITIONS

20 TPO: Thermoplastic PolyOlefin

22 ROOFING TERMINOLOGY: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and
24 Waterproofing Manual" for definition of terms related to roofing work in this Section.

26 PERFORMANCE REQUIREMENTS

28 PROVIDE INSTALLED ROOFING MEMBRANE AND BASE FLASHINGS that remain watertight; do not permit
30 the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather
without failure.

32 MATERIAL COMPATIBILITY: Provide roofing materials that are compatible with one another under conditions
34 of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field
experience.

36 FM/GLOBAL LISTING: Provide roofing membrane, base flashings, and component materials that comply with
38 requirements in FMG 4450 and FMG 4470 as part of a membrane roofing system and that are listed in FMG's
"Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.
40 Fire/Windstorm Classification: Class 1A-90
42 Hail Resistance: SH.

44 SUBMITTALS

46 PRODUCT DATA: For each type of product indicated.

48 SHOP DRAWINGS: For roofing system. Include plans, elevations, sections, details, and attachments to other Work:
50 Base flashings and membrane terminations.
52 Tapered insulation, including slopes.
Insulation fastening patterns.
Membrane seaming plan (indicating additional perimeter and corner attachments)

54 INSTALLER CERTIFICATES: Signed by roofing system manufacturer certifying that Installer is approved,
authorized, or licensed by manufacturer to install roofing system.

56 MANUFACTURER CERTIFICATES: Signed by roofing manufacturer certifying that roofing system complies with
58 requirements specified in "Performance Requirements" Article. Submit evidence of meeting performance
requirements.

60 QUALIFICATION DATA: For Installer and manufacturer.

62 PRODUCT TEST REPORTS: Based on evaluation of comprehensive tests performed by manufacturer and
64 witnessed by a qualified testing agency, for components of roofing system.

66 RESEARCH/EVALUATION REPORTS: For components of membrane roofing system.

68 MAINTENANCE DATA: For roofing system to include in maintenance manuals.

2 WARRANTIES: Special warranties specified in this Section.

4 INSPECTION REPORT: Copy of roofing system manufacturer's inspection report of completed roofing installation.

6 QUALITY ASSURANCE

8 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 warranty.

10 MANUFACTURER QUALIFICATIONS: A qualified manufacturer that has FMG approval for membrane roofing system identical to that used for this Project.

12 SOURCE LIMITATIONS: Obtain components for membrane roofing system either from or approved by the roofing membrane manufacturer.

16 FIRE-TEST-RESPONSE CHARACTERISTICS: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

20 EXTERIOR FIRE-TEST EXPOSURE: Class B; ASTM E 108, for application and roof slopes indicated.

22 SURFACE-BURNING CHARACTERISTICS OF FOAM PLASTIC INSULATION: Provide materials that meet requirements of FM/Global 4450 or UL 1256 (provide written confirmation to authorities having jurisdiction upon request).

26 PREINSTALLATION CONFERENCE: Conduct conference at Project site. Comply with requirements in Division 1 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:

30 Meet with Owner, Architect, 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.

32 Review methods and procedures related to roofing installation, including manufacturer's written instructions.

34 Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

36 Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.

38 Review structural loading limitations of roof deck during and after roofing.

40 Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.

42 Review governing regulations and requirements for insurance and certificates if applicable.

44 Review temporary protection requirements for roofing system during and after installation.

46 Review roof observation and repair procedures after roofing installation.

46 DELIVERY, STORAGE, AND HANDLING

48 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, and directions for storing and mixing with other components.

52 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. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

56 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.

60 HANDLE AND STORE ROOFING MATERIALS and place equipment in a manner to avoid permanent deflection of deck.

64 PROJECT CONDITIONS

66 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.

WARRANTY

SPECIAL ROOF SYSTEM AND FLASHING WARRANTY: Manufacturer's warranty to include labor and material payment without monetary limitation (NDL), in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Failure includes roof leaks. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, roof insulation, fasteners, metal edge and associated sheet metal flashings, and other components of the membrane roofing system, and as follows:

- Non-prorated, and fully transferable (not limited to original Owner)
- Warranty limit up to 72 MPH wind speed (calculated at ground level)
- No Owner's signature required for execution of warranty, and
- Dispute settlement to be held in the state where the project is located
- WARRANTY PERIOD:** Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

MANUFACTURERS: Subject to compliance with requirements, provide products by the manufacturers specified. Alternative manufacturers must be proposed as "substitutions" per Division-1 requirements.

FABRIC-REINFORCED TPO SHEET: Uniform, flexible sheet formed from a thermoplastic polyolefin, internally fabric or scrim reinforced, and as follows:

- MANUFACTURERS:**
- Carlisle SynTec Incorporated.
 - GenFlex Roofing Systems.
 - Firestone Building Products Company
 - GAF Material Corporation
 - Sarnafil Inc.
 - Stevens Roofing Systems; Div. of JPS Elastomerics.

MEMBRANE CHARACTERISTICS:

Sheet thickness: 45 mils, nominal.

Exposed Colors:

- Roof Membrane surface: White, unless otherwise indicated**
- Parapet wall flashings: Beige or Tan, unless otherwise indicated**

Physical Properties:

- Breaking Strength: 225 lbf ; ASTM D 751, grab method.
- Elongation at Break: 15 percent; ASTM D 751.
- Tearing Strength: 55 lbf minimum; ASTM D 751, Procedure B.
- Brittleness Point: Minus 22 deg F.

Ozone Resistance: No cracks after sample, wrapped around a 3-inch- diameter mandrel, is exposed for 166 hours to a temperature of 104 deg F and an ozone level of 100 pphm; ASTM D 1149.

Resistance to Heat Aging: 90 percent minimum retention of breaking strength, elongation at break, and tearing strength after 166 hours at 240 deg F ; ASTM D 573.

Water Absorption: Less than 4 percent mass change after 166 hours' immersion at 158 deg F; ASTM D 471.

Linear Dimension Change: Plus or minus 2 percent; ASTM D 1204.

PROVIDE AUXILIARY MEMBRANE MATERIALS recommended by roofing system manufacturer for intended use and compatible with membrane roofing. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.

Typical sheet flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet membrane.

Alternative un-reinforced flashing: polyolefin sheet flashing of 55 mils minimum of same color as sheet membrane.

Bonding adhesive: Manufacturer's standard solvent-based bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.

Slip sheet: Manufacturer's recommended slip sheet, of type required for application.

Metal termination bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.

Metal battens: Manufacturer's standard aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.

Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

Miscellaneous accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.

2 AIR RETARDER: Vapor Retarder: ASTM D 4397 polyethylene sheet, 6 mils thick minimum, with maximum
4 permeance rating of 0.13 perm.

6 ROOF INSULATION: Provide preformed roof insulation boards that comply with requirements and referenced
standards, selected from manufacturer's standard sizes and of thicknesses indicated.

8 Polyisocyanurate board insulation: ASTM C 1289, Type II, with felt or glass-fiber mat facer on both major
surfaces.

10 **Minimum Insulation Thickness:** Provide multiple layers of insulation with minimum thickness of 1-1/2
inch at drains and scuppers, and as required to maintain an overall average minimum aged (15
year time-weighted LTTR) insulation value only (not including substrate or air surfaces) of

12 **R = 20.**

14 Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for
positive sloping to drain. Fabricate to slopes indicated.

16 **ALTERNATIVE POLYSTYRENE BOARD SYSTEM:** 1/4 inch thick minimum "Dens-Deck Prime" roof board,
18 installed per manufacturer's and FM/Global requirements for wind uplift rating indicated, installed with joints
staggered above double-layer of molded polystyrene board insulation meeting ASTM C 578 Type 8, 1.25 lb./cu. ft.
20 min. density, with an aged r-value of 4.25 and 3.9 at 40 and 75 deg F respectively, and meeting requirements of
FM/Global 4450 or UL 1256 for foam-plastic insulation in direct contact with metal deck (provide written
22 confirmation to authorities having jurisdiction upon request).

24 **INSULATION ACCESSORIES:** Roof insulation accessories recommended by insulation manufacturer for intended
use and compatible with membrane roofing.

26 Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions
in FMG 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system
manufacturer.

28 Cold Fluid-Applied Adhesive: Manufacturer's standard cold fluid-applied adhesive formulated to adhere
roof insulation to substrate.

30 **ROOF PROTECTION PADS:** Provide non-porous protection pads consisting of a minimum 45 mil membrane
32 matching primary roofing material and color, approved for use by membrane roofing system manufacturer. ,
intended either for heat-welded or self-sticking application to the roof membrane, and as approved for use by
34 membrane roofing system manufacturer. factory-formed or field-cut with corners trimmed to a 2" radius minimum,

36 **WALKWAY PADS:** Provide units 24" x 24" minimum or as otherwise indicated on the Drawings.

PIPING SUPPORT REINFORCEMENT: size to extend 6" outside of all piping supports.

38 **PIPING-SUPPORT PROTECTION PADS:** 45 mil minimum self-stick membrane matching primary roofing
40 membrane color and type - sized to extend 6" outside of all piping supports setting on top of roof membrane with
corners trimmed to 2" radius minimum.

42 PART 3 - EXECUTION

44 EXAMINATION

46 EXAMINE SUBSTRATES, AREAS, AND CONDITIONS, with Installer present, for compliance with the
following requirements and other conditions affecting performance of roofing system:

48 VERIFY THAT ROOF OPENINGS AND PENETRATIONS are in place and set and braced and that roof drains are
50 securely clamped in place.

52 VERIFY THAT WOOD BLOCKING, CURBS, AND NAILERS are securely anchored to roof deck at penetrations
and terminations and that nailers match thicknesses of insulation.

54 VERIFY THAT SURFACE PLANE FLATNESS and fastening of steel roof deck comply with requirements in
56 Division 5 Section "Steel Deck."

58 PREPARATION

60 CLEAN SUBSTRATE of dust, debris, moisture, and other substances detrimental to roofing installation according
62 to roofing system manufacturer's written instructions. Remove sharp projections.

64 PREVENT MATERIALS FROM ENTERING AND CLOGGING roof drains and conductors and from spilling or
66 migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is
forecast.

2 COMPLETE TERMINATIONS AND BASE FLASHINGS and provide temporary seals to prevent water from
4 entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and
6 discard temporary seals before beginning work on adjoining roofing.

8 AIR BARRIER INSTALLATION:

10 LOOSELY LAY air barrier in a single layer, side and end lapping each sheet a minimum of 4 inches. Do not seal
12 joints or seams.

14 INSULATION INSTALLATION

16 COORDINATE INSTALLING MEMBRANE ROOFING system components so insulation is not exposed to
18 precipitation or left exposed at the end of the workday.

20 COMPLY WITH membrane roofing system manufacturer's written instructions for installing roof insulation.

22 INSTALL MULTIPLE LAYERS OF INSULATION under area of roofing to achieve required thickness, with joints
24 of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.

26 TRIM SURFACE OF INSULATION where necessary at roof drains so completed surface is flush and does not
28 restrict flow of water.

30 INSTALL INSULATION WITH LONG JOINTS of insulation in a continuous straight line with end joints
32 staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.
34 Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

36 FASTEN INSULATION ACCORDING TO REQUIREMENTS IN FMG's "Approval Guide" for specified
38 Windstorm Resistance Classification - for "Grade-C" metal deck unless otherwise indicated.

40 Fasten insulation as required for a "fully-adhered" membrane installation (with air-barrier noted above)

42 ROOF MEMBRANE INSTALLATION - GENERAL

44 INSTALL ROOFING MEMBRANE over area to receive roofing according to roofing system manufacturer's
46 written instructions. Unroll roofing membrane and allow to relax before installing. Accurately align roofing
48 membranes and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end
50 laps.

52 LAYOUT MEMBRANE SHEETS with primary seams perpendicular to ribs of metal decking, and with
54 seams lap-shingled with slope of deck when possible.

56 **TIE-INS TO EXISTING ROOFING: Install membrane roofing and auxiliary materials to tie in to existing roofing to
58 maintain weathertightness of transition and to not void warranty for existing membrane roofing system.**

60 MECHANICALLY FASTEN all roofing membrane securely at terminations, penetrations, and perimeter of roofing,
62 and seal all edges. Space fasteners for "Grade-C" metal deck unless otherwise indicated. Spread sealant or mastic
64 bed over drain-flanges at deck-drains and securely seal membrane in place with clamping ring.

66 FULL-WELD SEAMS: Clean entire seam areas, overlap roofing membrane, and hot-air weld full-surface of seams
68 according to manufacturer's written instructions to ensure a watertight seam installation. Probe all seams after welds
70 have cooled to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.

Verify field strength of seams a minimum of twice daily and repair seam sample areas.

Repair tears, voids, and lapped seams in roofing membrane that does not meet requirements.

72 AT ADHERED MEMBRANE, apply bonding-adhesive to substrate and underside of membrane roofing at rate
74 required by manufacturer and allow to partially dry before installing membrane roofing. Do not apply to splice area
76 of membrane roofing.

78 MECHANICALLY-FASTENED ROOFING-MEMBRANE INSTALLATION

80 IN-SPLICE ATTACHMENT: Secure one edge of roofing membrane using fastening plates or metal battens
82 centered within membrane splice and mechanically fasten roofing membrane to roof deck. Field-splice seam.

84 THROUGH-MEMBRANE ATTACHMENT: Secure roofing membrane using fastening plates or metal battens and
86 mechanically fasten roofing membrane to roof deck. Cover battens and fasteners with a continuous cover strip.

88 BASE FLASHING INSTALLATION

2 INSTALL SHEET FLASHINGS AND PREFORMED FLASHING ACCESSORIES and adhere to substrates
4 according to membrane roofing system manufacturer's written instructions.

6 APPLY SOLVENT-BASED BONDING ADHESIVE to substrate and underside of sheet flashing at required rate
8 and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.

10 FLASH PENETRATIONS and field-formed inside and outside corners with sheet flashing.

12 CLEAN SEAM AREAS AND OVERLAP and firmly roll sheet flashings into the adhesive. Weld side and end laps
14 to ensure a watertight seam installation.

16 TERMINATE AND SEAL TOP OF SHEET FLASHINGS and mechanically anchor to substrate through
18 termination bars.

16 WALKWAY & PIPING SUPPORT SHEET INSTALLATION

18 PROVIDE WALKWAY PADS around sides of all rooftop equipment requiring service or maintenance, leading
20 from the roof-hatch or other access point(s) in a regular pattern, and where specifically indicated on the Drawings.
22 Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing
system manufacturer's written instructions. Place individual units with 6" minimum space between each pad.

24 INSTALL PIPING SUPPORT PROTECTION PADS (self-stick waste sheet) below all piping supports units
26 provided by others. Clean roofing of dirt and debris prior to installation. Peel-back protective sheeting from
protection pad and apply pad securely to surface of roofing membrane.

28 FIELD QUALITY CONTROL

30 TESTING AGENCY: Owner reserves the right to engage a qualified independent testing and roof inspecting entity
32 to perform roof tests and inspections and to prepare test reports.

34 MANUFACTURER'S FINAL ROOF INSPECTION: Arrange for roofing system manufacturer's technical
36 personnel to inspect roofing installation on completion and submit report to Architect.

38 REPAIR OR REMOVE AND REPLACE components of membrane roofing system where test results or inspections
40 indicate that they do not comply with specified requirements. Additional testing and inspecting, at Contractor's
expense, will be performed to determine compliance of replaced or additional work with specified requirements.

42 PROTECTING AND CLEANING

44 PROTECT MEMBRANE ROOFING SYSTEM from damage and wear during remainder of construction period.
46 When remaining construction will 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.

48 CORRECT DEFICIENCIES in or remove membrane roofing system that does not comply with requirements, repair
50 substrates, and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time
of Substantial Completion and according to warranty requirements.

52 END OF SECTION 07 54 23

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide sheet metal roofing and trim, where indicated on the Drawings, as specified herein,
and as necessary for complete installation. Types of applications include but are not limited to the following:
8 **Curved** Standing-Seam Metal roofing and trim

10 RELATED SECTIONS include the following:

Division 6 Section "Rough Carpentry" for wood nailers, curbs, and blocking.

12 Division-7 Section "Sheet Metal Flashing and Trim" for related sheet-metal work

14 Division 7 Section "Joint Sealants" for field-applied sheet metal roofing sealants.

PERFORMANCE REQUIREMENTS

18 INSTALL SHEET METAL ROOFING TO WITHSTAND wind loads, thermally induced movement, and exposure
to weather without failing, rattling, leaking, and fastener disengagement.

22 FABRICATE AND INSTALL sheet metal roofing to resisting the following forces according to recommendations
in FMG Loss Prevention Data Sheet 1-49:

24 Wind Zone 1: Concurrent with the local requirements.

26 THERMAL MOVEMENTS: Provide sheet metal roofing that allow for thermal movements resulting from the
following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints,
hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental
28 effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal
movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and
30 nighttime-sky heat loss.

Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

32 Water Infiltration: Provide sheet metal roofing that does not allow water infiltration to building interior.

SUBMITTALS

36 SUBMIT PRODUCT DATA including manufacturer's installation instructions and general recommendations for
38 each specified sheet material and fabricated product.

40 SUBMIT SHOP DRAWINGS showing layout, joining, profiles, and anchorages of fabricated work, including major
counter-flashings, trim/fascia units, expansion joint systems, etc., with plan & elevation layout at 1/4" scale, details
42 at 3" scale.

44 SHOW 3-DIMENSIONAL DETAILS in shop drawings where different joint conditions connect so that
tradespersons can clearly understand the intent and relationship of different materials and conditions.

QUALITY ASSURANCE

48 SHEET METAL ROOFING STANDARD: Comply with SMACNA's "Architectural Sheet Metal Manual."
50 Conform to dimensions and profiles shown unless more stringent requirements are indicated.

DELIVERY, STORAGE, AND HANDLING

54 DELIVER SHEET METAL ROOFING MATERIALS and fabrications undamaged. Protect materials and
56 fabrications during transportation and handling. Unload, store, and install materials and fabrications in a manner to
prevent bending, warping, twisting, and surface damage.

58 STACK MATERIALS on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not
60 store materials in contact with other materials that might cause staining, denting, or other surface damage.

COORDINATION

62 COORDINATE INSTALLATION of sheet metal roofing with interfacing and adjoining construction to provide a
64 leakproof, secure, and noncorrosive installation.
66

PART 2 - PRODUCTS

CURVED STANDING SEAM ROOFING: Prefinished aluminum panels, in longest practical lengths, true to shape, accurate in size, square, and free from distribution or manufacturing defects. Provide the following, product/manufacturer or approved equal:

Product / Manufacturer: Firestone Metal Product's "Una-Clad - UC-7" Snap-On Seam type system – fabricated with curve

Panel Size: 12" wide – center to center of seams

Height of Standing Seams: 1.0 inch nominal

Panel Material: .032 inch thick aluminum sheet – smooth surface

Finish: Fluoropolymer 2-Coat "Kynar 500" System

Color: As indicated on Drawings, or as selected from manufacturer's standard range (not premium)

[CURVED] STANDING SEAM ROOFING: Prefinished aluminum panels, with UL-90 wind resistance rating, in longest practical lengths, true to shape, accurate in size, square, and free from distribution or manufacturing defects. Provide the following, product/manufacturer or approved equal:

Product / Manufacturer: Firestone Metal Product's "Una-Clad - UC-1" Snap-On Seam type system – fabricated with curve

Panel Size: 18" wide – center to center of seams

Height of Standing Seams: 1.5 inch nominal

Panel Material: .040 inch thick aluminum sheet – smooth surface

Finish: Fluoropolymer 2-Coat "Kynar 500" System

Color: As indicated on Drawings, or as selected from manufacturer's standard range (not premium)

CURVED STANDING SEAM ROOFING: Prefinished aluminum panels, with UL-90 wind resistance rating, in longest practical lengths, true to shape, accurate in size, square, and free from distribution or manufacturing defects. Provide the following, product/manufacturer or approved equal:

Product / Manufacturer: Firestone Metal Product's "Una-Clad - UC-7" Snap-On Seam type system – fabricated with curve

Panel Size: 12" wide – center to center of seams

Height of Standing Seams: 1.0 inch nominal

Panel Material: .032 inch thick aluminum sheet – smooth surface

Finish: Fluoropolymer 2-Coat "Kynar 500" System

Color: As indicated on Drawings, or as selected from manufacturer's standard range (not premium)

SHEET METAL ROOFING TRIM: ASTM B 209, Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, finished to match roofing material above, and as follows:

Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.

STANDING SEAM ROOFING: Prefinished 24-gage galvanized, smooth steel metal panels, with UL-90 wind resistance rating and with weathertight warranty, meeting ASTM B 370 in longest practical lengths, true to shape, accurate in size, square, and free from distribution or manufacturing defects.

Manufacturer: "Berridge" or approved equal (www.berridge.com)

Panel Material: 24 gage galvanized steel – smooth surface

Finish: Fluoropolymer 2-Coat System (as indicated above – Kynar 500)

Product: "Tee-Panel" Standing Seam System or "Curved Tee-Panels" (as applicable at canopies)

Panel Size: 12-3/4" wide – center to center of seams

Height of Standing Seams: 1.0 inch nominal

Product: "High-Seam Tee-Panel System" (in straight or curved panels as indicated)

Panel Size: 18-1/4" wide – center to center of seams

Spacing – edge to edge: 16 inch centers

Height of Standing Seams: 1.5 inch nominal

Product: "Z-lock Standing Seam System" or "Curved Z-lock Standing Seam System"

Standing Seams: Double locked

Spacing – edge to edge: 16 inch centers

Height: 2.0 inch nominal

UNDERLAYMENT MATERIALS

TYPICAL UNDERLAYMENT: 10-mil thick polyethylene sheet complying with ASTM D 4397.

FELTS: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

SLIP SHEET: Rosin-sized paper, minimum 3 lb/100 sq. ft.

WATERPROOF MEMBRANE UNDER METAL ROOFING: Self-Adhering, heat-resistant polyethylene-faced sheet complying with ASTM D 1970, 40 mils thick minimum, consisting of slip-resisting polyethylene-film reinforcing and top surface laminated to SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide "CCW WIP 403HR" heat-resistant roofing underlayment as manufactured by Carlisle Coatings & Waterproofing, Div. of Carlisle Companies Inc., or equivalent "high-temperature" membrane as recommended by roofing manufacture .

SHEET METAL ROOFING ACCESSORIES: Provide pre-finished aluminum sheet metal components required for a complete metal roofing assembly including trim, fascia, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match color and finish of sheet metal roofing, unless otherwise indicated, and/or as otherwise indicated below:

Cleats: Mechanically seamed cleats formed from minimum .050 aluminum sheet metal

SNOW GUARDS: Fabricated clear, UV stabilized polycarbonate units for adhesively attachment to flat surfaces of metal roofing without penetrating the metal panels, complete with manufacturer's recommended adhesive for cold-weather applications. Design is based on the use of: # RTCLSR as manufactured by: Berger Building Products, 805 Pennsylvania Boulevard, Feasterville, PA 19053, 1-800-523-8852, website: www.snowbrakes.com. Equivalent products as manufactured by Alpine, M. J. Mullane Company, Sieger, Snow Management Systems, or Zaleski are also acceptable, pending color matching (or clear) with the roofing panel.

SNOW GUARDS: Extruded aluminum units with custom powder-coat finish to match color of metal roofing, with two each (2) stainless-steel fasteners in pre-drilled holes per unit, designed to be anchored without penetrating the seam of the metal roofing panels. Provide "# 33 U - Snowguard for Standard Double-Lock Seams" as manufactured by:, Alpine SnowGuards; Phone: 1-888-766-4273; website: (www.alpinesnowguards.com). Equivalent products with equal or better performance and visual characteristics as manufactured by Berger, M. J. Mullane Company, Sieger, Snow Management Systems, or Zaleski are also acceptable, pending color matching to roofing panel:

MISCELLANEOUS MATERIALS

PROVIDE MATERIALS AND TYPES OF FASTENERS, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal roofing installation.

FASTENERS: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads.

Expoed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied coating.

Fasteners for Roofing: Blind fasteners or self-drilling screws, gasketed, with hex washer head.

Blind Fasteners: High-strength aluminum or stainless-steel rivets.

SEALING TAPE: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

ELASTOMERIC SEALANT: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal roofing and remain watertight.

BUTYL SEALANT: ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene plasticized, heavy bodied for hooked-type expansion joints with limited movement.

BITUMINOUS COATING: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

FABRICATION

FABRICATE SHEET METAL roofing to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated. Shop fabricate items where practicable. Obtain field measurements for accurate fit before shop fabrication.

CONCEAL FASTENERS AND EXPANSION PROVISIONS where possible on exposed-to-view sheet metal roofing, unless otherwise indicated.

FABRICATE CLEATS AND ATTACHMENT DEVICES from same material as accessory being anchored or from compatible, noncorrosive metal.

Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application but not less than thickness of metal being secured.

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FINISHES

COMPLY WITH NAAMM'S "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

PROTECT MECHANICAL AND PAINTED FINISHES on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

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 the 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.

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PART 3 - EXECUTION

EXAMINATION: Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored. Proceed with installation only after unsatisfactory conditions have been corrected.

INSTALLATION, GENERAL

ANCHOR SHEET METAL ROOFING 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 roofing system. Torch cutting of sheet metal roofing is not permitted.

METAL PROTECTION: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

INSTALL SHEET METAL ROOFING without excessive oil canning, buckling, and tool marks. Install sheet metal roofing true to line and levels indicated. Provide uniform, neat seams with minimum exposure of sealant. Install sheet metal roofing to fit substrates and to result in watertight performance.

EXPANSION PROVISIONS: Provide for thermal expansion of exposed roofing:

FASTENERS: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

With Aluminum Sheet Metal: Use aluminum or stainless-steel fasteners.

SEAL JOINTS WITH ELASTOMERIC SEALANT as required for watertight construction.

Where sealant-filled joints are used, 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 moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.

Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

SHEET-METAL ROOFING INSTALLATION:

INSTALL ROOFING SYSTEM plumb, level and true, in accordance with manufacturer's instructions, final shop drawings, and SMACNA Architectural Sheet Metal manual and standard practices.

INSTALL STARTER AND EDGE STRIPS before underlayment is installed.

INSTALL WATERPROOF MEMBRANE UNDERLAYMENT in accordance with manufacturer's instructions beginning at the roof edge and extending up roof slope to 24 inches inside of interior wall line (minimum), measured perpendicular to the floor. Lap ends and edges 6 inches minimum. At all valleys of metal roofing, install waterproofing underlayment in one continuous sheet, from top to bottom of valley, and extending 18 inches minimum in width in each direction.

INSTALL WATERPROOF MEMBRANE UNDERLAYMENT over entire roof substrate of the area intended to receive the sheet-metal roofing system, in shingle fashion, lapping ends 12 inches and edges 6 inches minimum, per manufacturer's instructions. (Waterproof membrane underlayment is not required at metal canopies).

2 INSTALL TYPICAL UNDERLAYMENT over remainder of roof substrate intended to receive the sheet-metal
roofing system, in shingle fashion, lapping ends 12 inches and edges 6 inches minimum.

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6 INSTALL SLIP-SHEET OVER UNDERLAYMENT (typical and waterproof) also in shingle fashion, lapping ends
12 inches and edges 6 inches minimum.

8
10 INSTALL SHEET METAL ROOFING by anchoring roofing and other components securely in place, with
provisions for thermal and structural movement. Install fasteners, protective coatings, separators, sealants, and other
miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal
roofing:

12 Field cutting of sheet metal roofing by torch is not permitted.

14 Fasten with self-tapping screws.

14 Locate and space fastenings in uniform vertical and horizontal alignment.

16 Locate splices over, but not attached to, structural supports. Stagger roofing splices and end laps to avoid a
four-panel lap splice condition.

16 Roofing Fasteners: Use stainless-steel fasteners.

18 Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against
galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-
asphalt underlayment to each contact surface, or by other permanent separation as recommended
by fabricator of sheet metal roofing or manufacturers of dissimilar metals.

20 Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize
22 possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

24
26 FABRICATE AND INSTALL SHEET METAL ROOFING work with lines and corners of exposed units true and
accurate. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks, considering
temper and reflectivity of metal. Provide uniform, neat seams with minimum exposure of sealant. Fold back sheet
28 metal to form a hem on concealed side of exposed edges, unless otherwise indicated.

30 Install cleats to hold sheet metal panels in position. Attach each cleat with two fasteners to prevent
rotation.

32 Nail cleats not more than 12 inches o.c. Bend tabs over nails.

34 Seal joints as shown and as required for leakproof construction. Provide low-slope transverse seams using
cleats where backup of moisture may occur. Embed hooked flanges of joint members not less than
1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time
36 of installation is moderate, between 40 and 70 deg, set joint members for 50 percent movement
either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not
38 install sealant-type joints at temperatures below 40 deg F.

40 CLEANING AND PROTECTION

42 CLEAN EXPOSED METAL SURFACES of substances that interfere with uniform oxidation and weathering.

44 REMOVE TEMPORARY PROTECTIVE COVERINGS and strippable films as sheet metal roofing are installed.
On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet
46 stems, and pieces of flashing. Maintain in a clean condition during construction.

48 REPLACE SHEET METAL ROOFING that is damaged or that has deteriorated beyond successful repair by finish
touchup or similar minor repair procedures.

50

END OF SECTION 07 61 00

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide sheet metal flashing and sheet metal trim, where indicated on the Drawings, as
8 specified herein, and as necessary for complete installation. Types of applications include but are not limited to the
following:

10 Wall flashing at head and sill of framed wall openings (except at masonry through-wall flashings)

12 Formed roof drainage system, including gutters and downspouts with screens

14 Formed low-slope roof flashing and trim.

16 Formed wall flashing and trim.

Low-slope soldered-seam roofing

Metal cricket flashing(s)

Soffit vents

"Z" flashing trims at exterior walls

18 RELATED SECTIONS include the following:

20 Division 4 Section "Unit Masonry Assemblies" for masonry through-wall flashing

22 Division 6 Section "Rough Carpentry" for wood nailers, curbs, and blocking.

24 Division 7 Section "Composition Shingles" for installing sheet metal flashing and trim integral with
roofing.

26 Division 7 Section "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and
other manufactured roof accessory units.

28 Division 7 Section "Joint Sealants" for field-applied sheet metal flashing and trim sealants.

PERFORMANCE REQUIREMENTS

30 INSTALL SHEET METAL FLASHING AND TRIM TO WITHSTAND wind loads, structural movement,
32 thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener
disengagement.

34 FABRICATE AND INSTALL ROOF EDGE FLASHING and copings capable of resisting forces according to
36 recommendations in FMG Loss Prevention Data Sheet 1-49:

Wind Zone: Concurrent with the local requirements.

38 THERMAL MOVEMENTS: Provide sheet metal flashing and trim that allow for thermal movements resulting from
40 the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of
42 joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other
44 detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal and trim thermal
movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and
nighttime-sky heat loss.

46 Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

48 Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building
interior.

SUBMITTALS

50 SUBMIT PRODUCT DATA including manufacturer's installation instructions and general recommendations for
52 each specified sheet material and fabricated product.

54 SUBMIT SHOP DRAWINGS showing layout, joining, profiles, and anchorages of fabricated work, including major
56 counter-flashings, trim/fascia units, expansion joint systems, etc., with plan & elevation layout at 1/4" scale, details
at 3" scale.

58 SHOW 3-DIMENSIONAL DETAILS in shop drawings where different joint conditions connect so that
tradespersons can clearly understand the intent and relationship of different materials and conditions.

60 SAMPLES FOR VERIFICATION: For each type of exposed finish required, prepared on Samples of size indicated
62 below:

Sheet Metal Flashing: 12 inches long for each color used.

Metal Roofing: 12 x 12 inch panel of each panel and finish

64 LIST OF MOCKUP MATERIALS: List manufacturer's product/color names, finishes, and other information as
66 required to identify materials used. Submittal is for information only. Neither receipt of list nor approval of mockup
constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to
68 the attention of the Architect and approved in writing.

2 QUALITY ASSURANCE

4 SHEET METAL FLASHING AND TRIM STANDARD: Comply with SMACNA's "Architectural Sheet Metal
6 Manual." Conform to dimensions and profiles shown unless more stringent requirements are indicated.
8 Copper Standard: Comply with CDA's "Copper in Architecture Handbook."

10 **MOCKUP:**

12 **PROVIDE MATERIALS** for construction of a field mockup of each different color and finish of sheet metal Work
14 indicated, showing the full range of exposed color and finish textures to be expected in the completed construction.

16 **BEFORE INSTALLING THE WORK OF THIS SECTION**, build mockup to verify selections made under sample
18 Submittals and to demonstrate aesthetic effects. Refer to Division-1 Section Quality Requirements for general
20 requirements of Mockup.

22 DELIVERY, STORAGE, AND HANDLING

24 DELIVER SHEET METAL FLASHING MATERIALS and fabrications undamaged. Protect sheet metal flashing
26 and trim materials and fabrications during transportation and handling. Unload, store, and install sheet metal
28 flashing materials and fabrications in a manner to prevent bending, warping, twisting, and surface damage.

30 STACK MATERIALS on platforms or pallets, covered with suitable weathertight and ventilated covering. Do not
32 store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or
34 other surface damage.

COORDINATION

COORDINATE INSTALLATION of sheet metal flashing and trim with interfacing and adjoining construction to
provide a leakproof, secure, and noncorrosive installation.

36 **PART 2 - PRODUCTS**

38 PREFINISHED ALUMINUM SHEET: ASTM B 209, Alloy 3003, 3004, 3105, or 5005, Temper suitable for
forming and structural performance required, but not less than H14, finished as follows:

40 Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially
42 formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent
polyvinylidene fluoride resin by weight; complying with AAMA 2605.

44 Color: As indicated on Drawings, in up to three (3) different colors throughout the project as selected by
the Architect from the manufacturer's full range

46 **PREPAINTED, METALLIC-COATED STEEL SHEET:** Zinc-coated (galvanized) structural quality steel sheet per
48 ASTM A 653 G90 coating, and pre-painted by the coil-coating process to comply with ASTM A 755, finish as
follows:

50 Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially
52 formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent
polyvinylidene fluoride resin by weight; complying with AAMA 2605.

54 Color: As indicated on Drawings, in up to three (3) different colors throughout the project as selected by
the Architect from the manufacturer's full range

56 **STAINLESS-STEEL SHEET FOR FLAT-SEAM ROOFING:** Zinc-tin alloy-coated stainless-steel meeting ASTM
58 A 240, Type 304, dead-soft, fully annealed, coated on both sides with a zinc-tin alloy (50 percent zinc, 50 percent
tin). Subject to compliance with requirements, provide "TCS II" by Follansbee Steel.

60 **COPPER SHEET:** Cold-rolled copper sheet meeting ASTM B 370, H00 temper, as manufactured by Revere
Copper Products, Inc., in minimum weight (Thickness) of 16 oz./sq. ft., unless otherwise required by applicable
SMACNA standard. Provide sheet materials pre-finished as follows:

62 **PRE-PATINATED COPPER FINISH:** "Evergreen" by Revere Copper, or approved equivalent

64 **PRE-PATINATED COPPER:** [Dark brown] [Verdigris], pre-patinated according to ASTM B 882.

66 **COPPER GUTTER UNITS:** Provide units fabricated to size and profile indicated on Drawings. Provide units
constructed of copper sheet. Stiffen outer edge with hemmed return, and fabricate outer edge 1/2" below back edge.
Provide 1/4" x 2" aluminum gutter brackets bent to match shape of gutter profile. Provide all gutters with screen of
68 1/4" aluminum hardware cloth in aluminum frame.

2 **COPPER DOWNSPOUTS:** Provide 5 inch width x 4 inch deep plain (flat surfaced - not corrugated) units typically
4 at locations indicated on drawings, fabricated from copper sheet. Provide fabricated, telescoping elbows as required
6 by building profile. Provide 1-1/4" x .050" thick downspout strap anchors matching color of downspout material at
8 48" maximum centers.

6 **UNDERLAYMENT MATERIALS**

8 TYPICAL UNDERLAYMENT: 10-mil thick polyethylene sheet complying with ASTM D 4397.

10 FELTS: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

12 SLIP SHEET: Rosin-sized paper, minimum 3 lb/100 sq. ft.

14 **MEMBRANE UNDERLAYMENT AT METAL ROOFING:** Self-Adhering, heat-resistant polyethylene-
16 faced sheet complying with ASTM D 1970, 40 mils thick minimum, consisting of slip-resisting
18 polyethylene-film reinforcing and top surface laminated to SBS-modified asphalt adhesive, with
20 release-paper backing; cold applied. Provide Carlisle's "CCW WIP 300HT", Grace's "Ultra",
22 Henry's "Blueskin PE200 HT", Owens Corning's "WeatherLock Metal High Temperature
24 Underlayment", or other equivalent "high-temperature" membrane as recommended by roofing
26 manufacture .

20 **MISCELLANEOUS MATERIALS**

22 **PROVIDE MATERIALS AND TYPES OF FASTENERS,** solder, welding rods, protective coatings, separators,
24 sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation.

26 **FASTENERS:** Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other
suitable fasteners designed to withstand design loads.

28 Exposed Fasteners: Heads matching color of sheet metal by means of plastic caps or factory-applied
coating.

30 Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws, gasketed, with hex washer head.

Blind Fasteners: High-strength aluminum or stainless-steel rivets.

32 **SEALING TAPE:** Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper
backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

34 **ELASTOMERIC SEALANT:** ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use
36 classifications required to seal joints in sheet metal flashing and trim and remain watertight.

38 **BUTYL SEALANT:** ASTM C 1311, single-component, solvent-release butyl rubber sealant, polyisobutylene
40 plasticized, heavy bodied for hooked-type expansion joints with limited movement.

42 **BITUMINOUS COATING:** Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film
44 thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other
deleterious impurities.

46 **SOLDER FOR ZINC-TIN ALLOY-COATED STAINLESS STEEL:** ASTM B 32, 100 percent tin

48 **FABRICATION, GENERAL**

50 **CUSTOM FABRICATE SHEET METAL** flashing and trim to comply with recommendations in SMACNA's
52 "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item
fabrication.

54 **FABRICATE SHEET METAL** flashing and trim in thickness or weight needed to comply with performance
56 requirements, but not less than that specified for each application and metal. Fabricate sheet metal flashing and trim
without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges
58 folded back to form hems.

60 TYPICAL SEALED JOINTS: Form nonexpansion but movable joints in metal to accommodate
elastomeric sealant to comply with SMACNA recommendations.

62 **EXPANSION PROVISIONS:** Where lapped or bayonet-type expansion provisions in the Work cannot be used,
64 form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant
concealed within joints.

66 **CONCEAL FASTENERS AND EXPANSION PROVISIONS** where possible on exposed-to-view sheet metal
flashing and trim, unless otherwise indicated.

68 **FABRICATE CLEATS AND ATTACHMENT DEVICES** from same material as accessory being anchored or from
70 compatible, noncorrosive metal.

Thickness: As recommended by SMACNA's "Architectural Sheet Metal Manual" and FMG Loss Prevention Data Sheet 1-49 for application but not less than thickness of metal being secured.

FABRICATED ITEMS:

FLAT-SEAM ROOFING: Form flat-seam pans from .015 inch thick stainless-steel sheets 20 inch by 28 inch with 1/2-inch notched and folded edges.

"Z-" FLASHING: Provide "Z"-shaped pre-primed aluminum flashing at exterior horizontal joints where indicated in the Drawings, of 0.032 inch thick prefinished aluminum minimum.

METAL CRICKET: .063" prefinished sheet aluminum, color to approximate shingle color. Job-cut to size indicated on drawings, extending not less than 12" above adjacent roof surface.

FABRICATE PARAPET SCUPPERS of dimensions required with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fasten gravel guard angles to base of scupper. Fabricate from pre-finished 0.032 inch minimum thickness aluminum.

FABRICATE CONDUCTOR HEADS with flanged back and stiffened top edge and of dimensions and shape indicated on the Drawings, complete with outlet tubes, exterior flange trim and built-in overflows. Fabricate conductor heads from 0.032 inch minimum thickness aluminum, unless otherwise indicated.

FABRICATE COPINGS in 8 foot minimum to 10 foot maximum length units, with 1/2 inch wide joints between sections. Fabricate joint plates of same thickness as copings. When front fascia exceeds 4 inches in height, provide continuous cleat to support edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.

Metal: 0.050 inch thick pre-finished aluminum, minimum

Joint Style: Butt, with 12-inch- wide concealed backup plate and with 6-inch- wide exposed cover plate.

FABRICATE ROOF-EDGE FLASHING in 8 foot minimum to 10 foot maximum length units, with 1/2 inch wide joints between sections. Fabricate joint plates of same thickness as metal roof edge. When front fascia exceeds 4 inches in height, provide continuous cleat supporting bottom edge of external leg and drill elongated holes for fasteners on interior leg. Miter corners, seal, and solder or weld watertight.

Metal: 0.050 inch thick pre-finished aluminum, minimum

Joint Style: Butt, with 6-inch- wide cover plate.

MISCELLANEOUS SHEET METAL FABRICATIONS: Fabricate the following from materials as noted:

Continuous cleats: .050 inch thick un-finished aluminum minimum

Base Flashing, counter-flashings flashing receivers: Fabricate pre-finished aluminum: 0.040 inch thick.

Roof-Penetrations: Lead: 4.0 lb/sq. ft.- hard tempered.

Valley, edges, eaves, rakes and hip flashing (in shingled roofing): .0320 inch thick aluminum, pre-finished where exposed

THROUGH-WALL FLASHINGS (typical at all openings in masonry or frame construction): Fabricate in sections not exceeding 12-foot- long (minimum 8-feet long at continuous units) at shelf angles in masonry construction, at head and sill openings in either masonry or frame construction, and at all locations where indicated on the Drawings. Fabricate discontinuous lintel, sill, and similar flashings to extend a minimum of four (4) inches beyond each side of wall openings. Form with 2-inch-high end dams where flashing is discontinuous. Fabricate with drip edge, by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees. Fabricate with preformed corners, end dams, other special shapes, and seaming materials at splices as applicable. Fabricate from 0.016 inch thick (25 gage) minimum stainless-steel sheet meeting ASTM A 240 or ASTM A 666, Type 304, dead soft, fully annealed, in 2D (dull, cold-rolled) finish, unless otherwise noted.

ROOF DRAINAGE SHEET METAL FABRICATIONS

FABRICATE GUTTER UNITS of prefinished .032 aluminum, to cross-section indicated on the Drawings, complete with end pieces, outlet tubes, and other accessories as required. Stiffen outer edge with hemmed return, and fabricate outer edge 1/2" below back edge. Fabricate in minimum 96-inch- long sections. Provide 1/4" x 2" aluminum gutter brackets bent to match shape of gutter profile. Furnish flat-stock gutter spacers fabricated from same metal as gutters, of size recommended by SMACNA but not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Provide all gutters with screen of 1/4" aluminum hardware cloth in aluminum frame.

DOWNSPOUTS: Provide size as indicated on drawings, fabricated either from 0.032 prefinished aluminum minimum. Provide fabricated, telescoping elbows as required by building profile. Provide 1-1/4" x .050" thick downspout strap anchors matching color of downspout material.

FINISHES

COMPLY WITH NAAMM'S "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

PROTECT MECHANICAL AND PAINTED FINISHES on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

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 the 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.

PRE-FINISHED "GREEN PATINA – ANTIQUED" COPPER FINISH: Provide green-toned antiqued surface finish to approximately match Architect's sample for all copper at project site. Comply with recommendations of the CDA (www.copper.org/resources/properties/protection/green.html) as applicable for green patina using multiple applications of ammonium chloride (salammontac). Apply raw linseed or lemon oil to arrest further weathering.

PART 3 - EXECUTION

EXAMINATION: Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of work. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored. Proceed with installation only after unsatisfactory conditions have been corrected.

INSTALLATION, 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. Torch cutting of sheet metal flashing and trim is not permitted.

METAL PROTECTION: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

Coat side of sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.

Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene underlayment.

Bed flanges in thick coat of asphalt roofing cement where required for waterproof performance.

INSTALL EXPOSED SHEET METAL FLASHING AND TRIM without excessive oil canning, buckling, and tool marks. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of sealant. 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.

PROVIDE CONTINUOUS CLEATS anchored at 12" inch centers maximum

EXPANSION PROVISIONS: Provide for thermal expansion of exposed flashing and trim:

Space joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection.

Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with elastomeric sealant concealed within joints.

FASTENERS: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

With Aluminum Sheet Metal: Use aluminum or stainless-steel fasteners.

SEAL JOINTS WITH ELASTOMERIC SEALANT as required for watertight construction.

Where sealant-filled joints are used, 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 moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.

Prepare joints and apply sealants to comply with requirements in Division 7 Section "Joint Sealants."

Aluminum Flashing: Rivet or weld joints in uncoated aluminum where necessary for strength.

ROOF DRAINAGE SYSTEM INSTALLATION

2 **INSTALL SHEET METAL ROOF DRAINAGE ITEMS** to produce complete roof drainage system according to
4 SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of
6 roof drainage system.

8 **HANGING GUTTERS:** Join sections with riveted and soldered joints or with lapped joints sealed with elastomeric
10 sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchored gutter brackets straps
12 spaced not more than 36 inches apart. Provide end closures and seal watertight with sealant. Slope to downspouts.

14 Fasten gutter spacers to front and back of gutter.

16 Loosely lock straps to front gutter bead and anchor to roof deck.

18 Anchor and loosely lock back edge of gutter to continuous cleat, eave or apron flashing.

20 Anchor back of gutter that extends onto roof deck with cleats spaced not more than 24 inches apart.

22 Anchor gutter with spikes and ferrules spaced not more than 24 inches apart.

24 Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion
26 joint caps.

28 Install continuous gutter screens on gutters with noncorrosive fasteners, removable for cleaning gutters.

30 **INSTALLATION OF DOWNSPOUTS:** Telescope upper sections into lower section 1-1/2" minimum, rivet and
32 seal. Elbow downspouts away from building at building offsets and toward building immediately below gutter
34 connection. Attach to wall strap anchors at downspout top, bottom, horizontal joints and at 10 feet maximum
36 centers. Secure straps to wall at masonry where downspouts are open ended, and extend 3" minimum into storm
38 drain boot or underground drainage system, when indicated.

ROOF FLASHING INSTALLATION

40 **INSTALL SHEET METAL ROOF FLASHING AND TRIM** to comply with performance requirements and
42 SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line,
44 and level as indicated. Install work with laps, joints, and seams that will be permanently watertight.

46 **ROOF EDGE FLASHING:** Anchor to resist uplift and outward forces according to recommendations in FMG Loss
48 Prevention Data Sheet 1-49 for specified wind zone and as indicated. Interlock bottom edge of roof edge flashing
50 with continuous cleats anchored to substrate at 6-inch centers.

52 **COPINGS:** Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data
54 Sheet 1-49 for specified wind zone and as indicated. Interlock exterior bottom edge of coping with continuous cleats
56 anchored to substrate at 16-inch centers. Anchor interior leg of coping with screw fasteners and washers at 24-inch
58 centers.

60 **METAL ROOF EDGE:** Anchor to resist uplift and outward forces according to recommendations in FMG Loss
62 Prevention Data Sheet 1-49 for specified wind zone and as indicated. Interlock exterior bottom edge of metal roof
64 edge with continuous cleats anchored to substrate at 16-inch centers. Anchor interior leg of coping with screw
66 fasteners and washers at 3-inch OC in staggered rows (6 inch OC each row) or as otherwise required by
68 Manufacturer's tested unit.

70 **PIPE OR POST COUNTERFLASHING:** Install counterflashing umbrella with close-fitting collar with top edge
72 flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band
74 and tighten.

76 **COUNTERFLASHING:** Coordinate installation of counterflashing with installation of base flashing. Insert
78 counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base
80 flashing. Lap counterflashing joints a minimum of 4 inches and bed with elastomeric sealant.

82 **ROOF-PENETRATION FLASHING:** Coordinate installation of roof-penetration flashing with installation of
84 roofing and other items penetrating roof. Install flashing as follows:

86 Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.

88 Seal with elastomeric sealant and clamp flashing to pipes penetrating roof except for lead flashing on vent
90 piping.

WALL FLASHING INSTALLATION

92 **INSTALL SHEET METAL WALL FLASHING** to intercept and exclude penetrating moisture according to
94 SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-
96 opening components such as windows, doors, and louvers.

98 **INSTALL WALL FLASHING** with weeped seals at all shelf angles, lintels, ledges, above storefront or window
framing, and other obstructions to the downward flow of water, behind stone veneer, EIFS, plaster or other similar

materials, and where indicated, except where through-wall masonry flashing is provided. Install continuous head and sill wall flashings at framed walls to extend 4 inches beyond the wall openings.

METAL ROOFING INSTALLATION:

INSTALL ROOFING SYSTEM plumb, level and true, in accordance with manufacturer's instructions, final shop drawings, and SMACNA Architectural Sheet Metal manual and standard practices.

INSTALL STARTER AND EDGE STRIPS before underlayment is installed.

INSTALL WATERPROOF MEMBRANE UNDERLAYMENT in accordance with manufacturer's instructions beginning at the roof edge and extending up roof slope to 24 inches inside of interior wall line (minimum), measured perpendicular to the floor. Lap ends and edges 6 inches. Over valleys prior to installing flashing, install waterproofing underlayment in one continuous sheet, top to bottom of valley, and extending 18 inches minimum in each direction.

INSTALL WATERPROOF MEMBRANE UNDERLAYMENT over entire roof substrate of the area intended to receive the sheet-metal roofing system, in shingle fashion, lapping ends 12 inches and edges 6 inches minimum, per manufacturer's instructions. (Waterproof membrane underlayment is not required at metal canopies).

INSTALL TYPICAL UNDERLAYMENT over all remaining roof substrate areas intended to receive metal roofing (metal canopies) entire roof substrate to receive roofing system, in shingle fashion, lapping ends 12 inches and edges 6 inches minimum.

INSTALL SLIP-SHEET OVER UNDERLAYMENT (typical and waterproof) also in shingle fashion, lapping ends 12 inches and edges 6 inches minimum.

INSTALL SHEET METAL ROOFING by anchoring roofing and other components securely in place, with provisions for thermal and structural movement. Install fasteners, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing:

Field cutting of sheet metal roofing by torch is not permitted.

Fasten with self-tapping screws.

Locate and space fastenings in uniform vertical and horizontal alignment.

Locate splices over, but not attached to, structural supports. Stagger roofing splices and end laps to avoid a four-panel lap splice condition.

Roofing Fasteners: Use stainless-steel fasteners.

Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by fabricator of sheet metal roofing or manufacturers of dissimilar metals.

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.

FABRICATE AND INSTALL SHEET METAL ROOFING work with lines and corners of exposed units true and accurate. Form exposed faces flat and free of buckles, excessive waves, and avoidable tool marks, considering temper and reflectivity of metal. Provide uniform, neat seams with minimum exposure of sealant. Fold back sheet metal to form a hem on concealed side of exposed edges, unless otherwise indicated.

Install cleats to hold sheet metal panels in position. Attach each cleat with two fasteners to prevent rotation.

Nail cleats not more than 12 inches o.c. Bend tabs over nails.

Seal joints as shown and as required for leakproof construction. Provide low-slope transverse seams using cleats where backup of moisture may occur. 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 moderate, between 40 and 70 deg, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.

FLAT-SEAM ROOFING: Attach flat-seam metal pans to substrate with cleats, starting at eave and working upward toward ridge. After pans are in place, mallet seams and apply sealant. Attach metal base flashing with cleats spaced not more than 24 inches o.c. Lock and solder pans to base flashing. Attach edge flashing to face of roof edge with continuous cleat nailed at 12 inches o.c. and attach to roof substrate with cleats. Lock pans to edge flashing and solder for watertight installation.

MISCELLANEOUS FLASHING INSTALLATION

EQUIPMENT SUPPORT FLASHING: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

- 2 CLEANING AND PROTECTION
- 4 CLEAN EXPOSED METAL SURFACES of substances that interfere with uniform oxidation and weathering.
- 6 REMOVE TEMPORARY PROTECTIVE COVERINGS and strippable films as sheet metal flashing and trim are
- 8 installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings,
- 10 pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- 12 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.
- 14 **END OF SECTION 07 62 00**

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide sheet-metal roofing specialties where indicated on the Drawings, as specified herein,
and as necessary for complete installation. Types of applications include but are not limited to the following:
8 Decorative Metal Finials
Pre-engineered Metal Cupola (design-build)

10 DESIGN/BUILD: In addition to providing metal fabrications, provide Professional Engineering Services for the
12 following:
14 Design of Ornamental Metal for canopies

RELATED SECTIONS:

16 Division 5 Section "Cold Formed Metal Framing" for metal framing members
18 Division 6 Section "Rough Carpentry" for wood nailers, curbs, and blocking.
Division 7 Section "Sheet Metal Flashing and Trim" for custom- and site-fabricated sheet metal flashing
and trim.
20 Division 7 Section "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and
other manufactured roof accessory units.
22 Division 7 Section "Joint Sealants" for field-applied sealants.

SUBMITTALS

26 PRODUCT DATA: For each type of product indicated. Include construction details, material descriptions,
28 dimensions of individual components and profiles, and finishes.

30 SHOP DRAWINGS: Show layouts of sheet-metal roofing specialties, including plans and elevations. Identify
factory- vs. field-assembled work. Include details for fastening, joining, supporting, and anchoring manufactured
32 roof specialties including fasteners, clips, cleats, and attachments to adjoining work. Provide templates for anchors
and bolts specified for installation under other Sections.

34 SUBMIT STRUCTURAL ANALYSIS DATA indicating compliance with design loads, and provide shop drawings
36 signed and sealed by the qualified Professional Engineer responsible for their preparation.

QUALITY ASSURANCE

40 FABRICATOR QUALIFICATIONS: A firm experienced in producing metal fabrications similar to those indicated
42 for this Project and with a record of successful in-service performance, as well as sufficient production capacity to
produce required units.

44 PROFESSIONAL ENGINEER QUALIFICATIONS: Legally qualified to practice in jurisdiction where Project is
46 located, experienced in providing engineering services of the kind indicated, with Professional Liability Insurance as
required in Supplementary Conditions.

48 QUALIFY WELDING PROCEDURES AND PERSONNEL according to the following:

50 AWS D1.1, "Structural Welding Code--Steel."
52 AWS D1.3, "Structural Welding Code--Sheet Steel."
Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved
54 and, if pertinent, has undergone recertification.

PERFORMANCE REQUIREMENTS OF PRE-ENGINEERED METAL CUPOLA:

56 STRUCTURAL: Provide unit capable of withstanding the following structural loads without exceeding the
58 allowable design working stress of the materials involved, including anchors and connections. Apply each load to
60 produce the maximum stress in each component:

62 Deflection Limits: Design framing systems to withstand design loads without deflections greater than 1/240
of the span with the following applied loads.
64 Gravity loads: Unit self-weight plus local code-required loads as indicated on the structural drawings.
Wind / Seismic loads: Per requirements of applicable local building code.

2 VENTILATION: Provide unit to provide “attic” ventilation as required by local codes and regulations, and not less
4 than 1/150 of the area of the unit with 50 percent of the ventilating “free-area” provided by openings located in the
6 upper portion of the unit. Provide all vents protected against intrusion by rain, snow, and insects.

8 SERVICE ACCESS: Provide minimum 18 inch high x 24 inch wide locking access door for maintenance access to
10 interior of unit.

12 PROJECT CONDITIONS

14 FIELD MEASUREMENTS: Where units are indicated to fit to other construction, verify dimensions by field
16 measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule
18 with construction progress to avoid delaying the Work.

20 ESTABLISHED DIMENSIONS: Where field measurements cannot be made without delaying the Work, establish
22 dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to
24 ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

26 COORDINATION

28 COORDINATE INSTALLATION OF ANCHORAGES, for metal fabrications. Furnish setting drawings, templates,
30 and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral
32 anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

34 COORDINATE INSTALLATION of manufactured roof specialties with interfacing and adjoining construction to
36 provide a leakproof, secure, and noncorrosive installation.

38 PART 2 - PRODUCTS

40 COPPER SHEET: ASTM B 370, Temper H00 or H01, cold rolled, mill finished, minimum 16 ounce sheet, unless
42 otherwise indicated.

44 TYPICAL COPPER FINISH: Manufacturer’s custom formulation of chemical treatment to produce a
46 “Green Patina” to match pre-patinated product.

48 METAL FRAMING & STRUCTURAL COMPONENTS: Refer to other Division-5 Sections as applicable.

50 MISCELLANEOUS MATERIALS

52 PROVIDE MATERIALS and types of fasteners, protective coatings, separators, sealants, and other miscellaneous
54 items required by manufacturer for a complete installation.

56 Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand
58 design loads.

60 Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-
62 paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

64 Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry
66 film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur
68 components, and other deleterious impurities.

Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D 4397.

Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.

PRE-ENGINEERED METAL CUPOLA: Custom fabricated unit in shape and profile as indicated on the Drawings.
Unit to be constructed with a galvanized steel framing sub-structure and with solid-copper sheet finish with fully-
soldered exterior joints. Engineer assembly to comply with all applicable codes and regulations, and to provide full
ventilation and maintenance access from the roof.

DECORATIVE METAL FINIALS: Custom fabricated units constructed from solid-copper sheet with fully-soldered
exterior joints typically. Solder attach spire/finial element to a solid-copper skirt flashing of 24 inch height
minimum. Provide units in shape and profile as indicated on the Drawings.

APPROVED MANUFACTURERS include, but are not limited to the following, pending conformance with
requirements indicated herein:

COPPERCRAFT, 4995 Keller Haslet Road, Keller, TX 76248, Phone (800) 486-2723, email:
www.coppercraft.com - Contact: Dave Thomas at (913)238-6614

FABRICATION:

SHOP ASSEMBLY: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. 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.

SHEAR AND PUNCH METALS cleanly and accurately. Remove burrs.

EASE EXPOSED EDGES to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

WELD CORNERS AND SEAMS CONTINUOUSLY to comply with the following:

Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.

Obtain fusion without undercut or overlap.

Remove welding flux immediately.

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.

PROVIDE FOR ANCHORAGE of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

CUT, REINFORCE, DRILL, AND TAP METAL FABRICATIONS as indicated to receive finish hardware, screws, and similar items.

FABRICATE JOINTS that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.

ALLOW FOR THERMAL MOVEMENT resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

FORM EXPOSED WORK TRUE TO LINE AND LEVEL with accurate angles and surfaces and straight sharp edges.

REMOVE SHARP OR ROUGH AREAS on exposed traffic surfaces.

FORM EXPOSED CONNECTIONS WITH HAIRLINE JOINTS, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

FINISHES

COMPLY WITH NAAMM'S "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

PROTECT MECHANICAL AND PAINTED FINISHES on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

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 the 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.

PRE-FINISHED "GREEN PATINA – ANTIQUED" COPPER FINISH: Provide green-toned antiqued surface finish to approximately match Architect's sample for all copper at project site. Comply with recommendations of the CDA (www.copper.org/resources/properties/protection/green.html) as applicable for green patina using multiple applications of ammonium chloride (salammontac). Apply raw linseed or lemon oil to arrest further weathering.

PART 3 - EXECUTION**EXAMINATION**

2 EXAMINE SUBSTRATES, AREAS, AND CONDITIONS, with Installer present, to verify actual locations,
3 dimensions, and other conditions affecting performance of work.

4 EXAMINE ROOFING CONDITIONS for suitable substrate conditions required for installation of manufactured
5 roof specialties.

6 VERIFY THAT SUBSTRATE is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

8 PROCEED WITH INSTALLATION only after unsatisfactory conditions have been corrected.

12 INSTALLATION

14 INSTALL UNITS ACCORDING TO MANUFACTURER'S written instructions. Anchor manufactured roof
15 specialties securely in place and capable of resisting forces specified in performance requirements. Use fasteners,
16 separators, sealants, and other miscellaneous items as required to complete manufactured roof specialty systems.

18 METAL PROTECTION: Where dissimilar metals will contact each other or corrosive substrates, protect against
19 galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as
20 recommended by manufacturer.

22 COAT CONCEALED SIDE of units with bituminous coating where in contact with wood, ferrous metal,
or cementitious construction.

24 UNDERLAYMENT: Where installing units directly on cementitious or wood substrates, install a course of felt
25 underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.

26 BED FLANGES IN THICK COAT OF ASPHALT ROOFING CEMENT where required by manufacturers of roof
27 specialties for waterproof performance.

30 INSTALL UNITS LEVEL, PLUMB, true to line and elevation, and without warping, jogs in alignment, excessive
31 oil-canning, buckling, or tool marks. Install units to fit substrates and to result in watertight performance. Verify
32 shapes and dimensions of surfaces to be covered before manufacture.

34 FASTENERS: Use fasteners of type and size recommended by manufacturer but of sizes that will penetrate
35 substrate not less than 2" for screws (nails not permitted).

38 SEAL EXPOSED JOINTS (if any exist) with elastomeric sealant as required by manufacturer.

40 CLEANING AND PROTECTION

42 CLEAN EXPOSED METAL SURFACES of substances that interfere with uniform oxidation and weathering.

44 CLEAN AND NEUTRALIZE flux materials. Clean off excess solder and sealants.

46 REMOVE TEMPORARY PROTECTIVE COVERINGS and strippable films as units are installed. On completion
47 of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and
48 pieces of flashing. Maintain in a clean condition during construction.

50 REPLACE SHEET-METAL ROOF SPECIALTIES that have been damaged or that cannot be successfully repaired
51 by finish touchup or similar minor repair procedures.

54 END OF SECTION 07630

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
 4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide roof accessories where indicated on the Drawings, as specified herein, and as
 8 necessary for complete installation. Types of applications include but are not limited to the following:
 Roof hatches

10 RELATED SECTIONS include the following:
 12 Division 5 Section "Metal Fabrications" for ladders and miscellaneous metal framing and supports.
 Division 6 Section "Rough Carpentry" for roof sheathing, wood cants, and wood nailers.

14 STANDARDS: Comply with the following:
 16 SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap
 flashing to coordinate with type of roofing indicated.
 18 NRCA's "Roofing and Waterproofing Manual" details for installing units.

20 SUBMITTALS

22 PRODUCT DATA: For each type of product indicated. Include construction details, materials, dimensions of
 24 individual components and profiles, and finishes.

26 SHOP DRAWINGS: Show fabrication and installation details. Indicate dimensions, weights, loadings, required
 28 clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments
 to other Work.

PART 2 - PRODUCTS

30 MATERIALS, GENERAL

32 Aluminum Sheet: ASTM B 209 for alclad alloy 3005H25 or alloy and temper required to suit forming
 operations, with mill finish, unless otherwise indicated.

34 Extruded Aluminum: ASTM B 221 alloy 6063-T52 or alloy and temper required to suit structural and
 finish requirements, with mill finish, unless otherwise indicated.

36 Galvanized Steel Sheet: ASTM A 653 with G90 coating designation; commercial quality, unless otherwise
 indicated.

38 Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792 with Class AZ-50 coating, structural quality,
 Grade 40, or as required for strength.

40 Insulation: Manufacturer's standard rigid or semirigid glass-fiber board of thickness indicated.

42 Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use,
 complying with AWPA C2; not less than 1-1/2 inches thick.

44 Security Grilles: 3/4-inch- diameter, hardened steel bars spaced 6 inches o.c. in one direction and 12 inches
 o.c. in the other. Weld bar intersections and ends of bars to structural frame or primary curb walls.
 Clean and paint with rust-inhibitive metal primer.

46 Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal
 as recommended by manufacturer. Match finish of exposed fasteners with finish of material being
 48 fastened.

Where removing exterior exposed fasteners affords access to building, provide nonremovable fastener
 50 heads.

52 Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of
 foam rubber, sponge neoprene, or cork.

54 Bituminous Coating: SSPC-Paint 12, solvent-type bituminous mastic, nominally free of sulfur and
 containing no asbestos fibers, compounded for 15-mil dry film thickness per coating.

56 Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.

58 Elastomeric Sealant: Generic type recommended by unit manufacturer that is compatible with joint
 surfaces; ASTM C 920, Type S, Grade NS, Class 25, and Uses NT, G, A, and, as applicable to
 joint substrates indicated, O.

60 Roofing Cement: Provide materials compatible with roofing membrane, and approved for use by roofing
 manufacturer, per requirements of roofing system warranty.

62 CONCRETE SPLASH-BLOCK: Provide reinforced, 3000 PSI minimum pre-cast concrete splash-block, 12” wide x
 30” deep minimum where indicated on the Drawings.

64

66 ROOF HATCHES WITH SAFETY POST & RAILING SYSTEM:

FABRICATE UNITS TO WITHSTAND 40-lbf/sq. ft. external and 20-lbf/sq. ft. internal loading pressure. Frame with minimum 12-inch- high, integral-curb, double-wall construction with 1-1/2-inch insulation, formed cants and cap flashing (roofing counterflashing), with welded or sealed mechanical corner joints. Reinforce frame at corners for mounting safety railing. Provide double-wall cover (lid) construction with 1- inch- thick insulation core. Provide gasketing and equip with corrosion-resistant or hot-dip galvanized hardware including pintle hinges, hold-open devices, interior padlock hasps, and both interior and exterior latch handles.

TYPE: Single-leaf personnel access.

SIZE: For Ladder Access (typical): 30 by 36 inches, or as otherwise indicated on drawings

MATERIAL: Aluminum or galvanized steel, or in combination

FINISH: Baked enamel in high-gloss "Safety red" color

AVAILABLE MANUFACTURERS: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- | | |
|-------------------------------|--------------------------------|
| Acralight | Babcock-Davis Hatchways, Inc. |
| Bilco Company. | Bristolite Skylights |
| Custom Curb, Inc. | Dur-Red Products, Inc. |
| Goeller Enterprises. | Hi Pro International, Inc. |
| J. L. Industries, Inc. | Metallic Products Corporation. |
| Milcor, Inc. | Nystrom Products Co. |
| O'Keeffe's Inc. | Precision Stair Corporation. |
| Roof Products & Systems Corp. | ThyCurb, Inc. |
| Trimco, Inc. | Wasco Products, Inc. |

LADDER SAFETY POST: Manufacturer's standard ladder safety post. Post to lock in place on full extension. Provide release mechanism to return post to closed position.

Height: 42 inches above finished roof deck.

Material and Finish: 1-5/8" minimum diameter galvanized steel tube or mill finished aluminum.

SAFETY RAILING SYSTEM: "KeeHatch" Railing System Model # RHSR-SS by Kee Industrial Products Inc. of Buffalo NY (www.keyhatch.com/us/) or equivalent manufacturer's standard complete system including rails, clamps, fasteners, safety barrier at railing opening, and all accessories required for a complete installation.

Height: 42 inches above finished roof deck.

Pipe or Tube: 1-1/4-inch ID galvanized pipe or 1-5/8-inch OD galvanized tube.

Chain Passway Enclosure: Galvanized proof coil chain with quick link on fixed end.

Pipe Ends and Tops: Covered or plugged with weather-resistant material.

Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.

Fabricate joints that will be exposed to weather in a watertight manner.

Close exposed ends of handrail and railing members with prefabricated end fittings.

FINISHES, GENERAL

COMPLY WITH NAAMM'S "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

PROTECT MECHANICAL FINISHES on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

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 the 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.

PART 3 - EXECUTION

INSTALLATION

COMPLY WITH MANUFACTURER'S written instructions. Coordinate installation of roof accessories with installation of roof deck, roof insulation, flashing, roofing membranes, penetrations, equipment, and other construction involving roof accessories to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight. Anchor roof accessories securely to supporting structural substrates so they are capable of withstanding lateral and thermal stresses, and inward and outward loading pressures.

2 INSTALL ROOF ACCESSORY ITEMS according to construction details of NRCA's "Roofing and Waterproofing
Manual," unless otherwise indicated. Comply with all requirements of the roofing system's warranty requirements,
4 so that warranty is not adversely affected by installation of units.

6 SEPARATE METAL FROM INCOMPATIBLE METAL or corrosive substrates, including wood, by coating
concealed surfaces, at locations of contact, with bituminous coating or providing other permanent separation.

8 FLANGE SEALS: Unless otherwise indicated, set flanges of accessory units in a thick bed of roofing cement to
10 form a seal.

12 CAP FLASHING: Where required as component of accessory, install cap flashing to provide waterproof overlap
with roofing or roof flashing (as counterflashing). Seal overlap with thick bead of mastic sealant.

14 OPERATIONAL UNITS: Test-operate units with operable components. Clean and lubricate joints and hardware.
16 Adjust for proper operation.

18 **CLEANING AND PROTECTION**

20 CLEAN EXPOSED SURFACES according to manufacturer's written instructions. Touch up damaged metal
22 coatings.

END OF SECTION 07 72 00

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 THIS SECTION INCLUDES firestopping for through-penetrations and joints in or between the following fire-
8 resistance rated assemblies, including both blank openings, linear openings, and openings containing penetrating
items:

- 10 1. Fire Wall assemblies
- 12 2. Fire Barrier assemblies
- 14 3. Fire Partition assemblies
- 16 4. Smoke Barrier assemblies
- 18 5. Smoke Partition assemblies
- 20 6. Fire-Resistance-Rated Horizontal assemblies.
- 22 7. Nonfire-Resistance-Rated Horizontal assemblies

18 PERFORMANCE REQUIREMENTS

20 PROVIDE THROUGH-PENETRATION FIRESTOP SYSTEMS that are produced and installed to resist spread of
22 fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-
resistance rating of assembly penetrated.

Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.

26 A. Fire test requirements

- 28 1. Underwriters laboratories, inc. (ul):
 - 30 A. Ansi/ ul263, “fire tests of building construction and materials”.
 - 32 B. Ansi/ ul723, “surface burning characteristics of building materials”.
 - 34 C. Ansi/ ul1479, “fire tests of through penetration firestops”.
 - 36 D. Ansi/ ul2079, “tests for fire resistance of building joint systems”.
- 38 2. American society of testing and materials (astm):
 - 40 A. Astm e84, “surface burning characteristics of building materials”.
 - 42 B. Astm e119, “fire tests of building construction and materials”.
 - 44 C. Astm e814, “fire tests of penetration fire stops”.
 - 46 D. Astm e1725, “standard test methods for fire tests of fire-resistive barrier systems for electrical
system components”.
 - 48 E. Astm e1966, “test method for fire resistive joint systems”.
 - 50 F. Astm e2174, “standard practice for on site inspection of installed fire stops”.
 - 52 G. Astm e2307, “fire tests of perimeter fire barrier systems using intermediate scale, multi-story test
apparatus”.
 - 54 H. Astm e2393, “standard practice for on site inspection of installed fire resistive joint systems and
perimeter fire barriers”.
 - I. Astm e2837, “determining the fire resistance of continuity head-of-wall joint systems installed
between rated wall assemblies and nonrated horizontal assemblies”.
 - J. Astm e3038 “standard practice for assessing and qualifying candidates as inspectors of firestop
systems and fire-resistive joint systems”

50 B. References

- 52 1. Underwriters laboratories (ul) of northbrook, il “fire resistance directory”.
 - 54 A. Through penetration firestop systems (xhez)

- B. Joint systems (xhbn)
- 2 C. Perimeter fire containment systems (xhdg)
- D. Continuity head-of-wall joint systems (xhbo)
- 4 E. Fill, void or cavity materials (xhhw)
- F. Firestop devices (xhji)
- 6 G. Forming materials (xhku)
- H. Wall opening protective materials (cliv)
- 8
- 2. All major building codes:
 - A. International building code
 - B. State adopted building code with amendments.
- 10
- 12 3. National fire protection association (nfpa) of quincy, ma “nfpa 101: life safety code”.
- 14 4. National fire protection association (nfpa) of quincy, ma “nfpa 70: national electrical code”.
- 16 5. Factory mutual approvals (fm) of norwood, ma “fm 4991: standard for approval of firestop contractors”.
- 18 6. Underwriters laboratories (ul) of northbrook, il “ul qualified firestop contractor program”
- 20 Performance requirements
 - 22 1. Provide products that upon curing do not re-emulsify, dissolve, leach, breakdown, or otherwise deteriorate over time from exposure to atmospheric moisture, sweating pipes, ponding water or other forms of moisture characteristic during and after construction.
 - 24 2. When intumescent products are used, provide products that do not contain sodium silicate or any other water-soluble intumescent ingredient in the formulation.
 - 26 3. Provide firestop products that do not contain ethylene glycol.
 - 28 4. Provide firestop sealants sufficiently flexible to accommodate motion such as pipe vibration, water hammer, thermal expansion and other normal building movement without damage to the seal.
 - 30 5. Pipe insulation shall not be removed, cut away or otherwise interrupted through wall or floor openings. Provide products appropriately tested for the thickness and type of insulation utilized.
 - 32 6. Fire rated pathway devices shall be the preferred product and shall be installed in all locations where frequent cable moves, add-ons and changes will occur. Such devices shall be:
 - 34 i. Capable of retrofit around existing cables
 - 36 ii. Designed such that two or more devices can be ganged together
 - 38 iii. Maintenance free such that no action is required to activate the smoke and fire sealing mechanism
 - 40 7. When mechanical cable pathways are not practical, openings within walls and floors designed to accommodate voice, data and video cabling shall be provided with re-enterable products specifically designed for retrofit.
 - 42 8. Provide fire-resistive joint sealants sufficiently flexible to accommodate movement such as thermal expansion and other normal building movement without damage to the seal.
 - 44 9. Provide fire-resistive joint sealants designed to accommodate a specific range of movement and tested for this purpose in accordance with a cyclic movement test criteria as outlined in Standards, ASTM E1966, or ANSI/ UL 2079.
 - 46 10. Provide penetration firestop systems, fire-resistive joint systems, or perimeter fire barrier systems subjected to an air leakage test conducted in accordance with Standard, ANSI/ UL1479 for penetrations and ANSI/UL2079 for joint systems with published L-Ratings for ambient and elevated temperatures as evidence of the ability of firestop system to restrict the movement of smoke.
 - 48 11. Provide T-Rating Collar Devices tested in accordance with ASTM E814 or ANSI/UL1479 for metallic pipe penetrations requiring T-Ratings per the applicable building code.
 - 50 12. Provide a fire-rated grommet for all individual or small grouped cable applications up to 0.53 in. (14 mm).
 - 52 13. Provide moisture-curing products where inclement weather or greater than transient water exposure is expected.
 - 54
 - 56

SUBMITTALS

2

PRODUCT DATA:

4

A. Product Data: For each type of firestopping product indicated.

6

B. System Drawings: Submit documentation from a qualified third-party testing agency that is applicable to each firestopping system configuration for construction, joint opening width and/or penetrating items.

8

C. Product Certificates: Certificate of conformance signed by manufacturers of firestopping products certifying that products comply with requirements.

10 SHOP DRAWINGS: For each through-penetration firestop system, show each kind of construction condition
12 penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation
14 of testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with
16 requirements for each condition indicated.

14

QUALITY ASSURANCE

18

A. Provide firestopping systems that comply with the following requirements and those specified in “performance criteria” article:

20

1. Firestopping tests are performed by a qualified, testing and inspection agency. A qualified testing and inspection agency is ul, or another agency performing testing and follow-up inspection services for firestop systems acceptable to authorities having jurisdiction.

22

2. Firestopping products bear classification marking of qualified testing and inspection agency.

24

B. Engage an experienced installer who is certified, licensed, fm approved in accordance with fm 4991, certified by ul as a qualified contractor, or otherwise qualified by the firestopping manufacturer as having been provided the necessary training to install firestop products per specified requirements. A manufacturer’s willingness to sell its firestopping products to contractor or to an installer engaged by contractor does not in itself confer qualifications on buyer.

26

C. Obtain firestop systems for each type of penetration or joint opening and construction condition indicated from a single manufacturer.

28

D. Conduct conference at project site to comply with requirements in division 1 section “project meetings”.

30

DELIVERY, STORAGE, AND HANDLING

38 DELIVER PRODUCTS to Project site in original, unopened containers or packages with intact and legible
40 manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if
42 applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and
44 mixing instructions for multicomponent materials.

46 STORE AND HANDLE MATERIALS for through-penetration firestop systems to prevent their deterioration or
48 damage due to moisture, temperature changes, contaminants, or other causes.

PROJECT CONDITIONS

50 ENVIRONMENTAL LIMITATIONS: Do not install through-penetration firestop systems when ambient or
52 substrate temperatures are outside limits permitted by through-penetration firestop system manufacturers or when
54 substrates are wet due to rain, frost, condensation, or other causes.

56 Do not use materials that contain flammable solvents.

VENTILATE through-penetration firestop systems per manufacturer's written instructions by natural means or, where this is inadequate, forced-air circulation.

2
4
COORDINATION

- 6 A. Coordinate construction of openings and penetrating items to ensure that through-penetration
firestop systems are installed according to specified requirements.
- 8 B. Coordinate sizing of sleeves, openings, core-drilled holes or cut openings to accommodate
through-penetration firestop systems.
- 10 C. Schedule installation of firestopping after completion of penetrating item installation but prior to
covering or concealing of openings.
- 12 D. Gypsum barriers with structural members at head of wall joint, frame opening per ul system.
- E. Coordinate gypsum barrier construction prior to installing penetrating items and firestop to
ensuring barrier integrity and continuity; shaft wall stage accordingly.

14 **PART 2 - PRODUCTS**

16 AVAILABLE MANUFACTURERS: A. Subject to compliance with through-penetration firestop systems
18 (XHEZ) and/or wall opening protective materials (CLIV) and/or joint systems (XHBN) and/or perimeter fire
containment systems (XHDG) and/or continuity head-of-wall joint systems (XHBO) listed in Volume 2 of the UL
Fire Resistance Directory, provide products of one of the following manufacturers as identified below:

- 20 DAP Inc.
- Firestop Systems Inc.
- 22 Hilti Construction Chemicals, Inc.
- Specified Technologies Inc.
- 24 3M Fire Protection Products.
- Tremco.
- 26 United States Gypsum Company.

28 FIRESTOPPING, GENERAL

30 COMPATIBILITY: Provide through-penetration firestop systems that are compatible with one another, with the
32 substrates forming openings, and with the items, if any, penetrating through-penetration firestop systems, under
conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based
on testing and field experience.

34 ACCESSORIES: Provide components for each through-penetration firestop system that are needed to install fill
36 materials and to comply with "Performance Requirements" Article. Use only components specified by through-
penetration firestop system manufacturer and approved by the qualified testing and inspecting agency for firestop
38 systems indicated. Accessories include, but are not limited to, the following items:

- Permanent forming/damming/backing materials, including the following:
 - 40 Slag-/rock-wool-fiber insulation.
 - Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill
42 materials in liquid state.
 - Fire-rated form board.
 - 44 Fillers for sealants.
 - Temporary forming materials.
 - 46 Substrate primers.
 - Collars.
 - 48 Steel sleeves.

50 APPLICATIONS / MATERIALS

- 2 A. Cast-in-place firestop devices: factory-assembled devices for use in cast-in-place concrete floors
4 and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of
6 the sleeve for fastening to concrete formwork, and a neoprene gasket.
- 8 B. Latex sealants: single-component latex formulations that do not re-emulsify after cure during
10 exposure to moisture.
- 12 C. Firestop devices: factory-assembled collars formed from galvanized steel and lined with
14 intumescent material sized to fit specific diameter of penetrant.
- 16 D. Intumescent composite sheets: rigid panels consisting of aluminum-foil-faced intumescent
18 elastomeric sheet bonded to galvanized-steel sheet.
- 20 E. Intumescent putties: nonhardening, water-resistant, intumescent putties containing no solvents or
22 inorganic fibers.
- 24 F. Intumescent wrap strips: single-component intumescent elastomeric strips for use around
26 combustible penetrants.
- 28 G. Mortars: prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement,
30 fillers and lightweight aggregate formulated for mixing with water at project site to form a
32 nonshrinking, homogeneous mortar.
- 34 H. Pillows/bags: compressible, removable, and reusable intumescent pillows encased in fire-retardant
36 polyester or glass-fiber cloth. Where exposed, cover openings with steel-reinforcing wire mesh to
38 protect pillows/bags from being easily removed.
- 40 I. Silicone foams: multicomponent, silicone-based liquid elastomers that, when mixed, expand and
42 cure in place to produce a flexible, nonshrinking foam.
- 44 J. Silicone sealants: single-component, silicone-based, neutral-curing elastomeric sealants.
- 46 K. Fire-rated cable sleeve kits: complete kits designed for new or existing cable penetrations through
48 walls to accept standard accessories.
- 50 L. Thermal wrap: flexible protective wrap tested and listed for up to 2-hour fire ratings in accordance
52 with astm e814/ul 1479 for membrane penetrations or astm e1725/ul 1724 for thermal barrier and
54 circuit integrity protection.
- M. Fire-rated cable pathways: single or gangable device modules composed of a steel raceway with
integral intumescent material and requiring no additional action in the form of plugs, twisting
closure, putty, pillows, sealant, or otherwise to achieve fire and air-leakage ratings.
- N. Retrofit device for cable bundles: factory-made, intumescent, collar-like device for firestopping
existing over-filled cable sleeves and capable of being installed around projecting sleeves and
cable bundles.
- O. Wall-opening protective materials: intumescent, non-curing putty pads or self-adhesive inserts for
protection of electrical switch and receptacle boxes.
- P. Fire-rated hvac retaining angles: steel angle system with integral intumescent firestop gasket for
use around rectangular steel hvac ducts without fire dampers.
- Q. Firestop plugs: flexible, re-enterable, intumescent, foam-rubber plug for use in blank
round openings and cable sleeves.

- 2 R. Fire-rated cable grommet: molded two-piece grommet made of plenum-grade polymer and foam
inner core for sealing small cable penetrations in gypsum walls up to 1/2-inch (13 mm) diameter.
- 4 S. Closet flange gasket: molded, single-component, flexible, intumescent gasket for use beneath a
water closet (toilet) flange in floor applications.
- 6 T. Endothermic wrap: flexible, insulating, fire-resistant, endothermic wrap for protecting membrane

8 **PART 3 - EXECUTION**

10 **PREPARATION**

- 12 A. Examination of Conditions: Examine areas and conditions under which work is to be performed and
14 identify conditions detrimental to proper or timely completion.
- 16 B. Surfaces to which firestop materials will be applied shall be free of dirt, grease, oil, scale, laitance, rust,
release agents, water repellents, and any other substances that may inhibit optimum adhesion.
- 18 C. Provide masking and temporary covering to prevent soiling of adjacent surfaces by firestopping materials.
- 20 D. Do not proceed until unsatisfactory conditions have been corrected.
PRIMING: Prime substrates where recommended in writing by through-penetration firestop system
manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of
bond; do not allow spillage and migration onto exposed surfaces.

22 **FIRESTOPPING INSTALLATION**

- 24 A. General Requirements: Install through-penetration firestop systems and fire-resistive joint systems in
26 accordance with "Performance Criteria" Article and in accordance with the conditions of testing and
classification as specified in the published design.
- 28 B. Manufacturer's Instructions: Comply with manufacturer's instructions for installation of firestopping
products.
- 30 1. Seal all openings or voids made by penetrations to ensure an air and water-resistant seal.
- 32 2. Consult with mechanical engineer, project manager, and damper manufacturer prior to
installation of through-penetration firestop systems that might hamper the performance of
34 fire dampers as it pertains to duct work.
- 36 3. Protect materials from damage on surfaces subjected to traffic.
- 38 4. Apply a suitable bond-breaker to prevent three-sided adhesion in applications where this
condition might occur such as the intersection of a gypsum wallboard/steel stud wall to
40 floor or roof assembly where the joint is backed by a steel ceiling runner or track.
- 42 5. Where joint application is exposed to the elements, fire-resistive joint sealant must be
approved by manufacturer for use in exterior applications and shall comply with ASTM
C-920, "Specification for Elastomeric Joint Sealants".
- 44 C. Install forming/damming/backing materials and other accessories of types required to support fill materials
during their application and in the position needed to produce cross-sectional shapes and depths required to
46 achieve fire ratings indicated. After installing fill materials, remove combustible forming materials and
other accessories not indicated as permanent components of firestop systems.
- 48 D. Install fill materials for firestop systems by proven techniques to produce the following results:
- 50 1. Fill voids and cavities formed by openings, forming materials, accessories, and
penetrating items as required to achieve fire-resistance ratings indicated.
- 52 2. Apply materials so they contact and adhere to substrates formed by openings and
penetrating items.
- 54 3. For fill materials that will remain exposed after completing Work, finish to produce
smooth, uniform surfaces that are flush with adjoining finishes.

- E. Identify through-penetration firestop systems with pressure-sensitive, self-adhesive, preprinted vinyl labels. Attach labels permanently to surfaces of penetrated construction on both sides of each firestop system installation where labels will be visible to anyone seeking to remove penetrating items or firestop systems. Include the following information on labels:
 - The words: "Warning--Through-Penetration Firestop System--Do Not Disturb. Notify Building Management of Any Damage."
 - Contractor's name, address, and phone number.
 - Through-penetration firestop system designation of applicable testing and inspecting agency.
 - Date of installation.
 - Through-penetration firestop system manufacturer's name.
 - Installer's name.

CLEANING AND PROTECTION

CLEAN OFF EXCESS FILL MATERIALS adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by through-penetration firestop system manufacturers and that do not damage materials in which openings occur.

PROVIDE FINAL PROTECTION AND MAINTAIN CONDITIONS during and after installation that ensure through-penetration firestop systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated through-penetration firestop systems immediately and install new materials to produce through-penetration firestop systems complying with specified requirements. Remove equipment, materials, and debris, leaving area in undamaged, clean condition.

END OF SECTION 07 84 00

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide joint sealers where indicated on the Drawings, as specified herein, and as necessary
8 for complete installation. Types of applications include but are not limited to the following:

10 EXTERIOR JOINTS in the following vertical or horizontal surfaces:

Pavement joints

Construction joints in cast-in-place concrete.

Control and expansion joints in unit masonry.

Joints in stone cladding and cast stone.

Joints in exterior insulation and finish systems.

Perimeter joints between exterior materials and frames of doors, windows, and louvers.

Control and expansion joints in ceilings, soffits and other overhead surfaces.

18 INTERIOR JOINTS in the following vertical surfaces and horizontal nontraffic surfaces:

Control and expansion joints on exposed interior surfaces of exterior walls.

Perimeter joints of exterior openings where indicated.

Vertical joints on exposed surfaces of interior unit masonry concrete walls and partitions.

Perimeter joints between interior wall surfaces and frames of interior doors windows.

Joints at Ceramic Tile Work

Joints between plumbing fixtures and adjoining walls, floors, and counters.

26 RELATED SECTIONS include the following:

Division 4 Section "Unit Masonry Assemblies" for masonry control and expansion joint fillers and gaskets.

Division 8 Section "Glazing" for glazing sealants.

Division 9 Section "Gypsum Board Assemblies" for sealing perimeter joints of gypsum board partitions to
30 reduce sound transmission.

PERFORMANCE REQUIREMENTS

34 PROVIDE ELASTOMERIC JOINT SEALANTS that establish and maintain watertight and airtight continuous joint
36 seals without staining or deteriorating joint substrates.

38 PROVIDE JOINT SEALANTS FOR INTERIOR APPLICATIONS that establish and maintain airtight and water-
40 resistant continuous joint seals without staining or deteriorating joint substrates.

SUBMITTALS

44 PRODUCT DATA: For each joint-sealant product indicated.

46 LIST OF MOCKUP MATERIALS: List manufacturer's product/color names, finishes, and other information as
48 required to identify materials used. Submittal is for information only. Neither receipt of list nor approval of mockup
constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to
the attention of the Architect and approved in writing.

QUALITY ASSURANCE

54 INSTALLER QUALIFICATIONS: Manufacturer's authorized Installer who is approved or licensed for installation
of elastomeric sealants required for this Project.

56 SOURCE LIMITATIONS: Obtain each type of joint sealant through one source from a single manufacturer.

58 PRECONSTRUCTION COMPATIBILITY AND ADHESION TESTING: Submit to joint-sealant manufacturers,
60 for testing indicated below, samples of materials that will contact or affect joint sealants. Use manufacturer's
standard test method to determine whether priming and other specific joint preparation techniques are required to
62 obtain rapid, optimum adhesion of joint sealants to joint substrates.

MOCKUP:

66 PROVIDE MATERIALS for construction of a field mockup of each different color and finish of sealant Work
68 indicated, showing the full range of exposed color and finish textures to be expected in the completed construction.

BEFORE INSTALLING THE WORK OF THIS SECTION, build mockup to verify selections made under sample Submittals and to demonstrate aesthetic effects. Refer to Division-1 Section Quality Requirements for general requirements of Mockup.

PROJECT CONDITIONS

DO NOT PROCEED WITH INSTALLATION of joint sealants under the following conditions:
When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
When joint substrates are wet.
Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
Contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

WARRANTY

SPECIAL INSTALLER'S WARRANTY: Installer's standard form in which Installer agrees to repair or replace elastomeric joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

Warranty Period: Two years from date of Substantial Completion.

SPECIAL MANUFACTURER'S WARRANTY: Manufacturer's standard form in which elastomeric sealant manufacturer agrees to furnish elastomeric joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

Warranty Period: Two years from date of Substantial Completion.

SPECIAL WARRANTIES specified in this Article exclude deterioration or failure of elastomeric joint sealants from the following:

- Movement of the structure resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression caused by structural settlement or errors attributable to design or construction.
- Disintegration of joint substrates from natural causes exceeding design specifications.
- Mechanical damage caused by individuals, tools, or other outside agents.
- Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

AVAILABLE MANUFACTURERS / PRODUCTS: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in other Part 2 articles.

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 sealant manufacturer, based on testing and field experience.

SEALANT COLORS: Match adjacent material color typically, as approved by the Architect.
The quantity of sealant colors is limited only by the number and color of adjacent materials indicated in the Drawings
Provide custom colors to match adjacent materials at no additional cost if manufacturer's "standard" colors do not match adjacent materials, in the professional opinion of the Architect
Provide multiple-colors of sealant as required by field-conditions when adjacent materials and their colors change throughout the height or width of a sealant joint

ELASTOMERIC JOINT SEALANTS

ELASTOMERIC SEALANTS: Comply with ASTM C 920 and other requirements indicated for each liquid-applied chemically curing sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

STAIN-TEST-RESPONSE CHARACTERISTICS: Where elastomeric sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

URETHANE TRAFFIC SEALANT: Comply with ASTM C 920 Type S (single component), grade P (pourable), class 25, use T (traffic). Available Products:
Bostik Findley; Chem-Calk 950.
Pecora Corporation; Urexpan NR-201.

2 Polymeric Systems Inc.; Flexiprene 952.
3 Schnee-Morehead, Inc.; Permthane SM7101.
4 Tremco; Tremflex S/L.
5 Tremco; Vulkem 45.

6 EXTERIOR SILICONE SEALANT: Comply with ASTM C 920 Type S (single component), grade NS (nonsag),
7 class 100/50, Use NT (nontraffic) and use related to joint substrates of M, G, A, and, as applicable to joint substrates
8 indicated, O. Available Products:

9 Dow Corning Corporation; 790.
10 GE Silicones; SilPruf LM SCS2700.
11 Pecora Corporation; 890 Silicone.
12 Tremco; Spectrem 1 (Basic).

14 BUTYL-RUBBER SEALANT: Comply with ASTM C 1085. Available Products:

15 Bostik Findley; Bostik 300.
16 Fuller, H. B. Company; SC-0296.
17 Fuller, H. B. Company; SC-0288.
18 Pecora Corporation; BC-158.
19 Polymeric Systems Inc.; PSI-301
20 Sonneborn, Division of ChemRex Inc.; Sonneborn Multi-Purpose Sealant.
21 Tremco; Tremco Butyl Sealant.

22 LATEX JOINT SEALANTS: Comply with ASTM C 834, Type P, Grade NF. Available Products:

23 Bostik Findley; Chem-Calk 600.
24 Pecora Corporation; AC-20+.
25 Schnee-Morehead, Inc.; SM 8200.
26 Sonneborn, Division of ChemRex Inc.; Sonolac.
27 Tremco; Tremflex 834.

30 TYPICAL SANITARY SILICONE SEALANT: Comply with ASTM C 920 Type S (single-component) and Grade
31 NS (nonsag), Class 25, white colored (unless otherwise indicated) mildew-resistant, acid-curing silicone sealant.
32 Available Products include:

33 Dow Corning Corporation; 786 Mildew Resistant
34 GE Silicones; Sanitary SCS1700
35 Pecora Corporation; 898 Sanitary Silicone.
36 Tremco; Tremsil 200

38 SANITARY SILICONE SEALANT W/O MILDEW RESISTANCE: Comply with ASTM C 920 Type S (single-
39 component) and Grade NS (nonsag) Class 25, white colored (unless otherwise indicated) acid-curing. Products
40 include:

41 Dow Corning Corporation; 999-A.
42 GE Silicones; Sanitary SCS1700.
43 Pecora Corporation; 860 Silicone
44 Tremco; Tremsil 200.

46 JOINT-SEALANT BACKING

48 PROVIDE SEALANT BACKINGS of material and type that are nonstaining; are compatible with joint substrates,
49 sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based
50 on field experience and laboratory testing.

52 CYLINDRICAL SEALANT BACKINGS: ASTM C 1330, and of size and density to control sealant depth and
53 otherwise contribute to producing optimum sealant performance:

56 ELASTOMERIC TUBING SEALANT BACKINGS: Neoprene, butyl, EPDM, or silicone tubing complying with
57 ASTM D 1056, nonabsorbent to water and gas, and capable of remaining resilient at temperatures down to minus 26
58 deg F. Provide products with low compression set and of size and shape to provide a secondary seal, to control
59 sealant depth, and to otherwise contribute to optimum sealant performance.

60 BOND-BREAKER TAPE: Polyethylene tape or other plastic tape recommended by sealant manufacturer for
61 preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such
62 adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

66 MISCELLANEOUS MATERIALS

68 PRIMER: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint
69 substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

2 CLEANERS FOR NONPOROUS SURFACES: Chemical cleaners acceptable to manufacturers of sealants and
3 sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates
4 and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint
5 substrates.

6 MASKING TAPE: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to
7 joints.
8

9 PART 3 - EXECUTION

10 EXAMINATION

11 EXAMINE JOINTS indicated to receive joint sealants, with Installer present, for compliance with requirements for
12 joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

13 PROCEED WITH INSTALLATION only after unsatisfactory conditions have been corrected.
14

15 PREPARATION

16 SURFACE CLEANING OF JOINTS: Clean out joints immediately before installing joint sealants to comply with
17 joint-sealant manufacturer's written instructions and the following requirements:

18 Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant,
19 including dust, paints (except for permanent, protective coatings tested and approved for sealant
20 adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing,
21 water repellents, water, surface dirt, and frost.

22 Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical
23 abrading, or a combination of these methods to produce a clean, sound substrate capable
24 of developing optimum bond with joint sealants. Remove loose particles remaining after
25 cleaning operations above by vacuuming or blowing out joints with oil-free compressed
26 air. Porous joint substrates include concrete and masonry.

27 Remove laitance and form-release agents from concrete.

28 Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm
29 substrates, or leave residues capable of interfering with adhesion of joint
30 sealants. Nonporous joint substrates include metal and glass.
31

32 JOINT PRIMING: Prime joint substrates, where recommended in writing by joint-sealant manufacturer, based on
33 preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant
34 manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or
35 migration onto adjoining surfaces.
36

37 MASKING TAPE: Use masking tape where required to prevent contact of sealant with adjoining surfaces that
38 otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove
39 sealant smears. Remove tape immediately after tooling without disturbing joint seal.
40

41 INSTALLATION OF JOINT SEALANTS

42 COMPLY WITH JOINT-SEALANT MANUFACTURER'S WRITTEN INSTALLATION INSTRUCTIONS for
43 products and applications indicated, unless more stringent requirements apply.
44

45 SEALANT INSTALLATION STANDARD: Comply with recommendations in ASTM C 1193 for use of joint
46 sealants as applicable to materials, applications, and conditions indicated.
47

48 INSTALL SEALANT BACKINGS of type indicated to support sealants during application and at position required
49 to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant
50 movement capability.

51 Do not leave gaps between ends of sealant backings.

52 Do not stretch, twist, puncture, or tear sealant backings.

53 Remove absorbent sealant backings that have become wet before sealant application and replace them with
54 dry materials.
55

56 INSTALL BOND-BREAKER TAPE behind sealants where sealant backings are not used between sealants and
57 backs of joints.
58

59 INSTALL SEALANTS using proven techniques that comply with the following and at the same time backings are
60 installed:

61 Place sealants so they directly contact and fully wet joint substrates.
62

Completely fill recesses in each joint configuration.

Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

TOOLING OF NONSAG SEALANTS: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified 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.

Remove excess sealant from surfaces adjacent to joints.

Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.

Provide concave joint configuration per Figure 5A in ASTM C 1193, unless otherwise indicated.

Provide flush joint configuration where indicated per Figure 5B in ASTM C 1193.

Provide recessed joint configuration of recess depth and at locations indicated per Figure 5C in ASTM C 1193. Use masking tape to protect surfaces adjacent to recessed tooled joints.

CLEANING

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.

PROTECTION

PROTECT JOINT SEALANTS during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

JOINT / SEALANTS SCHEDULE:

EXTERIOR PAVEMENT JOINTS: at perimeter of building at pavement (including sidewalks and curbs), and at pavement expansion joints:	Urethane
TYPICAL EXTERIOR VERTICAL BUILDING JOINTS, at perimeters of doors, windows, storefront frames (both sides) exterior wall penetrations, exterior building joints including masonry or stone as applicable, and at material control joints in masonry and EIFS system:	Exterior Silicone
EXTERIOR DOOR THRESHOLDS:	Butyl Rubber
TYPICAL INTERIOR JOINTS including but not limited to drywall joints:	Latex
TILE JOINTS and joints between countertops and walls in guest suites:	Sanitary Silicone
PLUMBING FIXTURES to walls:	Sanitary Silicone
JOINTS at floors, walls and equipment of Food-Service Preparation areas:	Sanitary Silicone w/o Mildew Resistance

END OF SECTION 07 92 00

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide hollow-metal type steel doors and frames where indicated on the Drawings, as
8 specified herein, and as necessary for complete installation.

10 RELATED SECTIONS: The following Sections contain requirements that relate to this Section:

12 Division 4 Section "Unit Masonry" for building anchors into and grouting frames in masonry construction.

14 Division 8 Section "Door Hardware" for door hardware and weatherstripping.

16 Division 9 Section "Gypsum Board Assemblies" for spot grouting frames in gypsum board partitions.

18 Division 9 Section "Painting" for field painting primed doors and frames.

SUBMITTALS

20 SUBMIT PRODUCT DATA for each type of door and frame specified, including details of construction, materials,
22 dimensions, hardware preparation, core, label compliance, sound ratings, profiles, and finishes.

24 DOOR SCHEDULE: Submit schedule of doors and frames using same reference numbers for details and openings
26 as those on Contract Drawings. Indicate coordination of glazing frames and stops with glass and glazing
28 requirements.

QUALITY ASSURANCE

30 COMPLY WITH ANSI/SDI 100 "Recommended Specifications for Standard Steel Doors and Frames" and as
32 specified.

DELIVERY, STORAGE, AND HANDLING

34 DELIVER DOORS AND FRAMES cardboard-wrapped or crated to provide protection during transit and job
36 storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

38 INSPECT DOORS AND FRAMES on delivery for damage. Minor damages may be repaired provided refinished
40 items match new work and are acceptable to Architect; otherwise, remove and replace damaged items as directed.

42 STORE DOORS AND FRAMES at building site under cover. Place units on minimum 4-inch- (100-mm-) high
44 wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If cardboard
wrappers on doors become wet, remove cartons immediately. Provide minimum 1/4-inch (6-mm) spaces between
stacked doors to promote air circulation.

PART 2 - PRODUCTS

46 ACCEPTABLE MANUFACTURERS: Subject to compliance with requirements, manufacturers offering products
48 that may be incorporated in the Work include, but are not limited to, the following:

50 Ceco Door Products.

52 Republic Builders Products.

54 Steelcraft.

MATERIALS

56 Hot-Rolled Steel Sheets and Strip: Commercial-quality carbon steel, pickled and oiled, complying with
58 ASTM A 569.

60 Cold-Rolled Steel Sheets: Carbon steel complying with ASTM A 366, commercial quality, or ASTM A
62 620, drawing quality, special killed.

64 Galvanized Steel Sheets: Zinc-coated carbon steel complying with ASTM A 526, commercial quality, or
66 ASTM A 642, drawing quality, hot-dip galvanized according to ASTM A 525, with A 60 or G 60
coating designation, mill phosphatized.

Supports and Anchors: Fabricated from not less than 0.0478-inch- thick steel sheet; 0.0516-inch- thick
galvanized steel where used with galvanized steel frames.

Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where items are to be built into exterior walls,
hot-dip galvanize complying with ASTM A 153, Class C or D as applicable.

2 POWDER-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 standard steel door
frames of type indicated.

4 MINERAL-FIBER INSULATION: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers
6 manufactured from slag or rock wool with 6- to 12-lb/cu. ft. (96- to 192-kg/cu. m) density; with maximum flame-
spread and smoke-developed indexes of 25 and 50 respectively; passing ASTM E 136 for combustion
8 characteristics.

10 GLAZING: Comply with requirements in Division 8 Section "Glazing."

12 BITUMINOUS COATING: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness
per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious
14 impurities.

16 GROUT: When required in masonry construction, comply with Division-4 Section "Unit Masonry" requirements,
with 4 inch maximum slump per ASTM C 143.

20 DOORS

22 STANDARD STEEL DOORS: Provide 1-3/4-inch- thick doors of materials and ANSI/SDI 100 grades and models
specified below, or as indicated on Drawings or schedules:

24 INTERIOR DOORS: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for
level and model and ANSI A250.4 for physical-endurance level:

26 Level 2 and Physical Performance Level B (Heavy Duty) with 0.042-inch (18 GA) steel faces both sides,
28 Model 2 (seamless seams).

30 EXTERIOR DOORS: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for
level and model and ANSI A250.4 for physical-endurance level:

32 Level 3 and Physical Performance Level A (Extra Heavy Duty) with 0.053-inch (16 GA) steel faces both
sides, Model 2 (seamless seams), galvanized.

34 HARDWARE REINFORCEMENT: Fabricate reinforcement plates from same material as door face sheets to
comply with the following minimum sizes:

36 Hinges: Minimum 0.123 inch thick (10 gage) by 1-1/2 inches wide by 6 inches longer than hinge, secured
38 by not less than 6 spot welds.

40 Pivots: Minimum 0.167 inch thick (7 gage) by 1-1/2 inches wide by 6 inches longer than hinge, secured by
not less than 6 spot welds.

42 Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch thick (14 gage).

All Other Surface-Mounted Hardware: Minimum 0.067 inch thick (14 gage).

44 DOUBLE SWING DOORS: "Eliaison Easy Swing" Model # SCP-8 or equal by "Chase Doors" constructed of
46 exterior grade plywood clad with high-pressure plastic laminate both sides (color from manufacturer's full range as
selected by Architect) with stainless steel edge trim, 18" S/S kickplate both sides, and with optional 9" x 14" clear
acrylic window set in black rubber molding, in size as indicated on the Drawings.

50 FRAMES

52 PROVIDE STEEL FRAMES for doors, transoms, sidelights, borrowed lights, and other openings that comply with
ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.

54 FABRICATE ALL FRAMES with mitered corners and continuously welded construction.

56 Interior frames for Level 2 interior doors: 0.042-inch (18 gage) thick steel sheet

58 Exterior frames for Level 3 Exterior Doors: 0.053-inch (16 gage) thick galvanized steel sheet.

60 HARDWARE REINFORCEMENT: Fabricate reinforcement plates from same material as frames to comply with
the following minimum sizes:

62 Hinges: Minimum 0.123 inch (10 gage) thick by 1-1/2 inches wide by 6 inches longer than hinge, secured
by not less than 6 spot welds.

64 Pivots: Minimum 0.167 inch (7 gage) thick by 1-1/2 inches wide by 6 inches longer than hinge, secured by
not less than 6 spot welds.

66 Lock Face, Flush Bolts, Closers, and Concealed Holders: Minimum 0.067 inch (14 gage) thick.

68 All Other Surface-Mounted Hardware: Minimum 0.067 inch (14 gage) thick.

Supports and Anchors: Fabricated from electrolytic zinc-coated or metallic-coated steel sheet.

JAMB ANCHORS:

Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (18 gage) 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.

Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (18 gage) thick.

Compression Type for Slip-on Frames: Adjustable compression anchors.

Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

Floor Anchors: Formed from same material as frames, not less than 0.042 inch (18 gage) thick, and as follows:

Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at finish floor surface.

DOOR SILENCERS: Except on weatherstripped frames, drill stops to receive 3 silencers on strike jambs of single-door frames and 2 silencers on heads of double-door frames.

PLASTER GUARDS: Provide minimum 0.016-inch- (24 gage) thick steel plaster guards or mortar boxes at back of hardware cutouts where mortar or other materials might obstruct hardware operation and to close off interior of openings.

FIXED FRAME MOLDINGS: Formed integral with standard steel frames, minimum 5.8 inch high, unless otherwise indicated.

TERMINATED STOPS AT TOILET-ROOM & INTERIOR KITCHEN AREA DOORS: Terminate stops to align with bottom edge of door (refer to drawings for height) with a 45-degree angle cut, and close open end of stop with steel sheet closure. Cover opening in extension of frame with welded-steel filler plate, with welds ground smooth and flush with frame.

FABRICATION

FABRICATE STEEL DOOR AND FRAME UNITS to be rigid, neat in appearance, and free from defects, warp, or buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site. Comply with ANSI/SDI 100 requirements.

INTERNAL CONSTRUCTION: One of the following manufacturer's standard core materials according to SDI standards:

Rigid polystyrene conforming to ASTM C 578.

Rigid mineral fiber with internal sound deadener on inside of face sheets.

CLEARANCES: Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than 1/4 inch (6.4 mm) between non-fire-rated pairs of doors. Not more than 3/4 inch (19 mm) at bottom.

FABRICATE EXPOSED FACES of doors and panels, including stiles and rails of nonflush units, from only cold-rolled steel sheet.

TOLERANCES: Comply with SDI 117 "Manufacturing Tolerances Standard Steel Doors and Frames."

FABRICATE CONCEALED STIFFENERS, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.

EXPOSED FASTENERS: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

THERMAL-RATED (INSULATING) ASSEMBLIES: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies. Unless otherwise indicated, provide thermal-rated assemblies with U-value rating as follows:

0.41 Btu/sq. ft. x h x deg F or better.

HARDWARE PREPARATION: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements of SDI 107 and ANSI A115 Series specifications for door and frame preparation for hardware.

REINFORCE DOORS AND FRAMES to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

LOCATE HARDWARE as indicated on Drawings or, if not indicated, according to the Door and Hardware Institute's (DHI) "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

FINISHES, GENERAL

COMPLY WITH NAAMM's "Metal Finishes Manual" for recommendations relative to applying and designating finishes.

COMPLY WITH SSPC-PA 1, "Paint Application Specification No. 1," for steel sheet finishes.

APPLY PRIMERS AND ORGANIC FINISHES to doors and frames after fabrication.

GALVANIZED STEEL SHEET FINISHES

FACTORY PRIMING FOR FIELD-PAINTED FINISH: Where field painting after installation is indicated, apply air-dried primer specified below immediately after cleaning and pretreatment.

SHOP PRIMER: Zinc-dust, zinc-oxide primer paint complying with performance requirements of FS TT-P-641, Type II.

STEEL SHEET FINISHES

SURFACE PREPARATION: Solvent-clean surfaces to comply with SSPC-SP 1 to remove dirt, oil, grease, and other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel to comply with SSPC-SP 5 (White Metal Blast Cleaning) or SSPC-SP 8 (Pickling).

PRETREATMENT: Immediately after surface preparation, apply a conversion coating of type suited to organic coating applied over it.

FACTORY PRIMING FOR FIELD-PAINTED FINISH: Apply shop primer that complies with ANSI A224.1 acceptance criteria, is compatible with finish paint systems indicated, and has capability to provide a sound foundation for field-applied topcoats. Apply primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

INSTALLATION

INSTALL STEEL DOORS, FRAMES, AND ACCESSORIES according to Shop Drawings, manufacturer's data, and as specified.

PLACING FRAMES: Comply with provisions of SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

Except for frames located in existing concrete, masonry, or gypsum board assembly construction, place frames before constructing enclosing walls and ceilings.

In masonry construction, install at least 3 wall anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.

At concrete or masonry construction, install at least 3 completed opening anchors per jamb adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.

In metal-stud partitions, install at least 3 wall anchors per jamb at hinge and strike levels. In steel-stud partitions, attach wall anchors to studs with screws.

In in-place gypsum board partitions, install knock-down, slip-on, drywall frames.

DOOR INSTALLATION: Fit hollow-metal doors accurately in frames, within clearances specified in ANSI/SDI 100.

ADJUSTING AND CLEANING

PRIME COAT TOUCHUP: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touchup of compatible air-drying primer.

PROTECTION REMOVAL: Immediately before final inspection, remove protective wrappings from doors and frames.

2 **END OF SECTION 08 11 13**

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide sectional overhead door(s) as a complete unit including frames, sections, brackets,
8 guides, tracks, counterbalance mechanisms, hardware, operators and installation accessories, to suit openings and
10 head room allowable, as shown on the drawings and specified herein, and as needed to meet the requirements of the
12 construction shown in the Contract Documents.

RELATED SECTIONS: FIELD PAINTING is specified in Division-9.

PERFORMANCE REQUIREMENTS

14 STRUCTURAL PERFORMANCE: Provide doors capable of withstanding the effects of gravity loads and the
16 following loads and stresses without evidencing permanent deformation of door components:

18 WIND LOAD: Uniform pressure of 20 lbs / sq. ft. (85 MPH) acting inward and outward.

SUBMITTALS:

20 SUBMIT PRODUCT DATA to include roughing-in diagrams, and installation instructions for each type and size of
22 overhead door. Include manufacturer's operating instructions and maintenance data.

24 FURNISH INSERTS AND ANCHORING DEVICES which must be set in concrete or built into masonry for
26 installation of units. Provide setting drawings, templates, instructions and directions for installation of anchorage
28 devices. Coordinate delivery with other work to avoid delay.

PART 2- PRODUCTS

30 ACCEPTABLE MANUFACTURERS: Subject to compliance with requirements, provide products of one of the
32 following or equivalent manufacturers:

34 Atlas Door Corp.	The Cookson Co.
Cornell Iron Works Inc.	Overhead Door Corp.
Raynor Manufacturing Co.	Track-Rite Door Inc.
Wayne-Dalton Corporation	J. G. Wilson Corp.
38 Windsor Door Div., The Ceco Corp.	

40 STEEL SECTIONS: Construct door sections from galvanized structural quality carbon steel sheets complying with
42 ASTM A446, Grade A, or ASTM A 526, with a minimum yield strength of 33,000 psi, and a minimum G-90 zinc
coating complying with ASTM A 525.

44 FABRICATE SECTIONS from a single sheet to provide units not more than 24" high, and nominal 2" deep. Roll
horizontal meeting edges to a continuous shiplap, rabbeted, or keyed weather seal, with a reinforcing flange return.

46 Panel Faces: 0.042 inch thick (18 gage) galvanized steel sheet on both the exterior and interior faces

48 ENCLOSE section ends with 0.042 inch thick (18 ga). galvanized steel channel end stiles welded in place. Provide
50 intermediate stiles, cut to door section profile, spaced at not more than 48" o.c. and welded in place.

52 REINFORCE bottom section with a continuous channel or angle conforming to bottom section profile. Reinforce
sections with continuous horizontal and diagonal reinforcing, as required by door width and design wind loading.

54 INSULATE inner core of steel sections with manufacturer's standard polystyrene, or polyurethane foam type
56 insulation. Enclose insulation with manufacturer's standard steel sheet secured to door panel.

58 FACTORY FINISH: Apply manufacturer's standard prime and finish coats, applied to interior and exterior door
faces.

TRACKS, SUPPORTS AND ACCESSORIES:

60 DOOR TRACKS: Manufacturer's standard system of galvanized steel track, sized for door size and weight. Provide
62 complete track assembly including brackets, bracing and reinforcing for rigid support of ball bearing roller guides,
64 for required door type and size. Slot vertical sections of track at 2" o.c. for door drop safety device. Slope tracks at

proper angle from vertical, or otherwise design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.

LOW-HEADROOM TYPE TRACKS: Manufacturer's optional low-headroom type system of galvanized steel track, sized for door size and weight, and designed and coordinated with site conditions. Provide complete track assembly including brackets, bracing and reinforcing for rigid support of ball bearing roller guides, for required door type and size. Slot vertical sections of track at 2" o.c. for door drop safety device. Slope tracks at proper angle from vertical, or otherwise design to ensure tight closure at jambs when door unit is closed. Weld or bolt to track supports.

TRACK REINFORCEMENT AND SUPPORTS: galvanized steel track reinforcement and support members. Secure, reinforce and support tracks as required for size and weight of door to provide strength and rigidity, and to ensure against sag, sway, and detrimental vibration during opening and closing of doors.

SUPPORT AND ATTACH tracks to opening jambs with continuous angle welded to tracks and attached to wall. Support horizontal (ceiling tracks) with continuous angle welded to track and supported by laterally-braced attachments to overhead structural members at curve and end of tracks.

WEATHER SEALS: continuous rubber adjustable weatherstrip gasket at tops and compressible astragal on bottoms of each overhead door. In addition, provide continuous flexible seals at door jamb edges for a fully weathertight installation.

HARDWARE:

HEAVY-DUTY, rust-resistant hardware, with galvanized or cadmium-plated or stainless steel fasteners, to suit type of door.

HINGES: heavy steel hinges at each end stile and at each intermediate stile, per manufacturer's recommendations for size of door. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is not possible.

ROLLERS: heavy-duty rollers, with steel ball bearings in case-hardened steel races, mounted with varying projections to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Provide case-hardened steel tires to suit size of track.

PULL HANDLES, LOCKS AND LATCHES: For manually-operated doors, furnish lifting handles, locks, and locking device with galvanized steel lifting handles, and with cremone type locking bars, operable from inside and outside. Lock cylinder is specified in other Division-8 sections.

FABRICATE locking device assembly with mortise lock, spring loaded dead bolt, chromium-plated operating handle, cam plate, and adjustable locking bar to engage through slots in tracks.

CHAIN LOCK KEEPER: Suitable for padlock.

COUNTERBALANCING MECHANISMS:

TORSION SPRING: Hang door assembly for operation by torsion spring counterbalance mechanism, consisting of adjustable tension tempered steel torsion springs mounted on a case-hardened steel shaft, and connected to door with galvanized aircraft type lift cable.

PROVIDE cast aluminum or grey iron casting cable drums, grooved to receive cable. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of shaft with one additional mid-point bracket for shafts up to 16' long and 2 additional brackets at 1/3-points to support shafts over 16' long, unless closer spacing recommended by door manufacturer.

INCLUDE a spring-loaded steel or bronze cam mounted to bottom door roller assembly on each side, designed to stop door automatically if either cable breaks. Provide either a compression spring or leaf spring bumper installed at end of each horizontal track to cushion door at end of opening operation.

MANUAL DOOR OPERATOR(S):

REDUCTION-DRIVE, MANUAL CHAIN-HOIST OPERATION: Side-mounted unit consisting of endless steel hand chain, chain pocket wheel with at least 3:1 reduction unit, and roller chain-and-sprocket drive or suitable gearing, end mounted on counterbalance shaft; operating with a maximum 35-lbf pull.

ELECTRIC DOOR OPERATOR(S):

2 FURNISH ELECTRIC DOOR OPERATOR assembly of size and capacity recommended and provided by door
3 manufacturer; complete with electric motor and factory-prewired motor controls, gear reduction unit, solenoid
4 operated brake, clutch, remote control stations and control devices.

6 PROVIDE HAND-OPERATED DISCONNECT or mechanism for automatically engaging sprocket chain operator
7 and releasing brake for emergency manual operation. Include interlock device to automatically prevent motor from
8 operating when emergency sprocket is engaged.

10 DESIGN OPERATOR so that motor may be removed without disturbing limit-switch adjustment and without
11 affecting emergency auxiliary operator.

12 DOOR OPERATOR TYPE: Provide trolley or drawbar type, V-belt and roller chain and sprocket primary drive, and
13 chain and sprocket secondary drive. Provide open-drip-proof type motor, and controller with NEMA Type 1
14 enclosure.

16 REMOTE CONTROL STATIONS: Provide momentary-contact, 3-button control stations with push button controls
17 labeled "open", "close" and "stop". Provide interior units, full-g geared, surface-mounted, heavy-duty, with general
18 purpose NEMA Type 1 enclosure. Provide exterior units, full-guarded, standard duty, surface-mounted,
19 weatherproof type, NEMA Type 4 enclosure, key-operated.

20 RADIO CONTROL: Provide radio control system (in addition to above) to coordinate with the Owner's existing
21 radio controlled door access system, consisting of the following:
22 3-channel universal coaxial receiver to open, close, and stop door, 1 per operator.
23 Four (4) each hand-held programable multifunction remote control units, and
24 Remote antenna mounting kit.

26 AUTOMATIC REVERSING CONTROL: Furnish each door with automatic safety switch, extending full width of
27 door bottom, and located within neoprene or rubber astragal mounted to bottom door rail. Contact with switch will
28 immediately reverse downward door travel. Furnish manufacturer's standard take-up reel or self-coiling cable.
29

30 PART 3 - EXECUTION

32 INSTALL door, track, and operating equipment complete with necessary hardware, jamb and head mold stops,
33 anchors, inserts, hangers, and equipment supports in accordance with final shop drawings, manufacturer's
34 instructions and as herein specified.

36 FASTEN vertical track assembly to framing at not less than 24" o.c. Hang horizontal track from structural overhead
37 framing with angle or channel hangers, welded and bolt-fastened in place. Provide sway bracing, diagonal bracing,
38 and reinforcing as required for rigid installation of track and door operating equipment.

40 UPON COMPLETION OF INSTALLATION, including work by other trades, lubricate, test and adjust doors to
41 operate easily, free from warp, twist, or distortion and fitting weathertight for entire perimeter.

44 **END OF SECTION 08 36 13**

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide Aluminum entrances and storefront framing where indicated on the Drawings, as
8 specified herein, and as necessary for complete installation.

10 RELATED SECTIONS: Hardware, Glass and Glazing are included in other applicable Division-8 sections of these
12 Specifications.

14 **SYSTEM PERFORMANCE REQUIREMENTS:**

16 PROVIDE ASSEMBLIES designed and fabricated to comply with the following, as demonstrated by testing
18 corresponding stock systems:

20 THERMAL MOVEMENT: Allow for expansion and contraction resulting from ambient temperature range
22 of 120 deg. F.

24 WIND LOAD: Provide capacity to withstand the minimum inward and outward uniform pressure loading
26 as indicated on the Drawing or as otherwise required below – whichever value is greater:

For clear spans up to 19 feet high: 25 PSF

For clear spans between 19 to 25 feet high: 27 PSF

28 DEFLECTION LIMITS OF FRAMING MEMBERS – NORMAL TO WALL PLANE:

Limit to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4
26 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of
28 individual glazing lites to 3/4 inch whichever is less.

30 DEFLECTION LIMITS OF FRAMING MEMBERS – PARALLEL TO GLAZING PLANE:

Limited to 1/360 of clear span or 1/8 inch, whichever is smaller

32 AIR & WATER LEAKAGES - FIXED FRAMING: Air infiltration of not more than 0.06 CFM per sq. ft.
34 of fixed area per ASTM E 283 and no uncontrolled water penetration per ASTM E 331 at
36 pressure differential of 6.24 PSF.

38 AIR & WATER LEAKAGES - ENTRANCES: Air infiltration per linear foot of perimeter crack of not
40 more than 0.50 CFM for single doors and 1.0 CFM for pairs of doors per ASTM E 283 at pressure
42 differential of 1.567.

44 ACCESSIBLE ENTRANCES: Provide entrances in compliance with both the U.S. Architectural & Transportation
46 Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and
48 Facilities (ADAAG).", and ICC/ANSI A117.1.

50 QUALITY ASSURANCE: Drawings are based on one manufacturer's standard aluminum entrance and storefront
52 system. Other standard systems of a similar and equivalent nature will be acceptable when differences do not
54 materially detract from design concept or intended performances, as judged solely by the Architect.

56 **SUBMITTALS**

58 SUBMIT PRODUCT DATA to include manufacturer's specifications, standard details, and installation
60 recommendations for components required, including test reports certifying compliance with performance
62 requirements.

64 SUBMIT SHOP DRAWING for fabrication and installation, including elevations, detail sections of typical
66 composite members, hardware mounting heights, anchorages, reinforcement, expansion provisions, and glazing.

PART 2 - PRODUCTS

68 PRODUCT BASIS: Unless otherwise indicated therein, the Drawings are based on the use of products
70 manufactured by "Kawneer Company, Inc." (www.kawneer.com) as follows:

72 STOREFRONT & FIXED-UNIT WINDOW FRAMING: "Trifab VersaGlaze 450 (1-3/4 inch wide
74 sightline) for 1/4 inch thick glazing, or "Trifab VersaGlaze 451 (2 inch sightline) for "center-plane" one (1)
76 inch thick insulated glass, with composite steel reinforcement to accommodate wind loads

78 ENTRANCE DOORS: "350 Series" Medium stile (3 1/2" min width) units for single pane 1/4" glazing,
80 WITH (6 1/2") inch high minimum bottom rail for accessibility compliance.

82 CURTAINWALL SYSTEM:

1600 Wall - System 1 (at horizontal units) and
1600 Wall - System 2 (at vertical units) for insulated glass with exposed vertical butt-glazing

FRONT-ACCESS DISPLAY WINDOWS: Stile and rail type, 1 3/4" thick, narrow-stile (2-1/8 inch width) tubular frame members with mechanically fastened and reinforced joints, for 1 inch insulated glazing,

BASIS OF DESIGN: Kawneer # 190 Series door units, with 2 pivot hinges and single keyed deadbolt

ACCEPTABLE MANUFACTURERS: Subject to compliance with unit size of products indicated and other requirements specified herein, products of one of the following alternative manufacturers are also acceptable:

Arch Amarlite – Arch Aluminum and Glass Inc. (www.archamarlite.com)

Vistawall Architectural Products (www.vistawall.com)

EFCO Corporation (www.efcocorp.com)

Manko Window Systems, Inc. (www.mankowindows.com)

Tubelite Architectural Systems (www.tubeliteinc.com)

YKK AP America Inc. (www.ykkap.com)

MATERIALS AND ACCESSORIES:

ALUMINUM MEMBERS: ASTM B 221 for extrusions, ASTM B 209 for sheet/plate

STEEL REINFORCEMENT complete with manufacturer's standard 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:

Structural Shapes, Plates, and Bars: ASTM A 36

Cold-Rolled Sheet and Strip: ASTM A 1008

Hot-Rolled Sheet and Strip: ASTM A 1011

FASTENERS: Aluminum, non-magnetic stainless steel, or other materials warranted by manufacturer to be noncorrosive and compatible with aluminum components. Exposed fasteners shall match finish of members and hardware being fastened.

CONCEALED FLASHING: Dead-soft stainless steel, 26 gage minimum, or extruded aluminum, 0.062" minimum, as selected by manufacturer for compatibility with other components.

BRACKETS AND REINFORCEMENTS: Manufacturer's high-strength aluminum units where feasible; or non-magnetic stainless steel or hot-dipped galvanized steel complying with ASTM A-386.

CONCRETE/MASONRY INSERTS: Cast-iron, malleable iron, or hot-dipped galvanized steel complying with ASTM A-386.

BITUMINOUS COATINGS: Cold-applied asphalt mastic complying with SSPC-PS 12, compounded for 30-mil thickness per coat.

COMPRESSION WEATHERSTRIPPING: Manufacturer's standard replaceable stripping of either molded neoprene gaskets complying with ASTM D 2000 or molded PVC gaskets complying with ASTM D 2287.

GLAZING SYSTEM: Provide manufacturer's standard compression type molded or extruded glazing gaskets that maintain uniform pressure and watertight seal, inside-outside matched, with provisions for glass replacement. Provide elastomeric type spacers and setting blocks.

HARDWARE:

REFER TO HARDWARE SECTION of Division 8 for requirements for hardware items other than those indicated herein to be provided by manufacturer of aluminum entrances.

PROVIDE DOOR MANUFACTURER'S STANDARD heavy-duty hardware units, including the following items of sizes, number, and type recommended by manufacturer for service required, finished to match door, unless otherwise indicated.

PIVOTS: mfr's std. top and bottom offset pivots – provide intermediate if door is over 7 feet

LOCKSET AT SINGLE EXTERIOR DOORS: Deadbolt lock with outside cylinder (Adams Rite # 1850S), inside lever/exit indicator (Adams Rite # 4550) and sign above door reading: "THIS DOOR TO REMAIN UNLOCKED WHEN BUILDING IS OCCUPIED"

LOCKSET AT DISPLAY-WINDOWS: Deadbolt lock with outside cylinder (Adams Rite # 1850S) without inside trim

3-POINT LOCKSET AT EXTERIOR DOOR PAIRS: Deadbolt lock with outside cylinder (Adams Rite # 1850S), inside lever/exit indicator (Adams Rite # 4550), header and threshold bolts (Adams Rite # 4016 and # 4015) in active leaf (flush-bolts in inactive leaf are not permitted),

CLOSERS: manufacturer's standard heavy duty surface mounted parallel-arm type unit with cast-iron body and cylinder (aluminum cylinder not acceptable) with integral stop, to comply with local codes and national handicapped accessibility requirements, as applicable.

PULLS: 12 inch high min. x 1 inch diameter satin-stainless steel offset tubular pull

PUSH-BARS: 1 inch diam. satin-stainless steel tubular push bar x 3"LDW (except at exit devices)

CONTRACTOR'S OPTIONAL EXIT DEVICES: Delete deadbolt lock or 3-point lockset system indicated above and inside push-bars, and provide manufacturer's standard "push-bar" type rim or concealed rod exit devices (equal to Dor-O-Matic 1590 Rim or 1490 CVR) with exterior cylinder, (not required by Building Code except at "Assembly" occupancies).

BOTTOM-RAIL SWEEP (at exterior doors): Manufacturer's standard door bottom sweep with concealed fasteners on mounting strip

THRESHOLD: 1/2" H x 5" wide "saddle" type with seal

FLOOR STOP: rubber cushioned cast bronze, 626 finish, 2-1/8" H x 2-3/8" long min.

GENERAL FABRICATION:

PREFABRICATION: Complete fabrication, assembly, finishing, hardware application, and other work before shipment to project site. Disassemble components only as necessary for shipment and installation. Comply with AWS recommendations to avoid discoloration; grind exposed welds smooth and restore mechanical finish. Install reinforcing if required for performance requirements; separate dissimilar metals with bituminous paint or other separator which will prevent corrosion. Maintain accurate relation of planes and angles, with hairline fit of contacting members. Conceal fasteners wherever possible.

WEATHER-STRIPPING: For exterior doors, provide compression weather-stripping against fixed stops; at other edges, provide sliding weather-stripping retained in adjustable strip mortised into door edge.

STOREFRONT FRAMING SYSTEM FABRICATION: Provide inside-outside matched resilient flush-glazed system with provisions for glass replacement. Shop-fabricate and pre-assemble frame components where possible.

ALUMINUM TRIM: Fabricate flat aluminum sheet in profiles indicated on Drawings or as required to provide closure at adjacent construction elements.

STILE AND RAIL TYPE ALUMINUM DOOR FABRICATION:

FRAME: Provide tubular frame members, fabricated with mechanical joints using heavy inserted reinforcing plates and concealed tie-rods or j-bolts, or fabricate with structurally welded joints, at manufacturer's option.

DESIGN: Provide Medium stile units with 3-1/2" nominal width, 1-3/4" thick, with glazing channels for single-pane glass typically (except as otherwise indicated).

FINISHES:

CLASS I COLOR ANODIZED FINISH: AA-M12C22A42/A44 (Mechanical Finish: as fabricated, nonspecular; Chemical Finish: etched, medium matte; Anodic Coating: Class I Architectural, film thicker than 0.7 mil with integral color or electrolytically deposited color) complying with AAMA 606.1 or AAMA 608.1.

Color: As indicated on the Drawings

PART 3 - EXECUTION

TAKE FIELD MEASUREMENTS prior to preparation of shop drawings and fabrication, to ensure proper fitting of Work.

COMPLY with manufacturer's instructions and recommendations for installation of aluminum entrances and storefronts.

SET UNITS PLUMB, level, and true to line, without warp or rack of framing members, doors, or panels. Anchor securely in place, separating aluminum and other corrodible metal surfaces from sources of corrosion of electrolytic action at points of contact with other materials.

DRILL AND TAP frames and doors and apply surface-mounted hardware items, complying with hardware manufacturer's instructions and template requirements. Use concealed fasteners wherever possible.

2 SET SILL MEMBERS in bed of sealant as indicated, or with joint fillers or gaskets as indicated to provide
weathertight construction. Comply with requirements of Division 7 for sealants, fillers, and gaskets.

4 ADJUST AND CLEAN:

6 ADJUST OPERATING HARDWARE to function properly, without binding, and to prevent tight fit at contact
8 points and weather-stripping.

10 CLEAN COMPLETED SYSTEM, inside and out, promptly after erection and installation of glass and sealants.
Remove excess glazing and joint sealants, dirt, and other substances from aluminum surfaces.

12 INSTITUTE PROTECTIVE MEASURES and precautions required to assure that aluminum entrances and
14 storefronts will be without damage or deterioration, other than normal weathering, at time of acceptance.

16 **END OF SECTION 08 41 13**

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide aluminum windows where indicated on the Drawings, as specified herein, and as
8 necessary for complete installation. This Section includes the following types of aluminum-framed windows:
Double Hung Windows – with both sashes tilting for cleaning

10 RELATED SECTIONS include the following:

Division 8 Section "Aluminum Entrances and Storefronts."

12 Division 8 Section "Glazing" for glazing requirements for aluminum windows, including those specified to
14 be factory glazed.

16 PERFORMANCE REQUIREMENTS:

18 REFERENCED STANDARD: provide windows capable of complying with American Architectural Manufacturers
20 Association, AAMA, Voluntary Specifications AAMA/NWWDA 101/I.S.2 and bearing the AAMA "Quality
Certified" label.

22 AAMA PERFORMANCE RATING: Class DH-C50

24 SUBMITTALS

26 PRODUCT DATA: Include construction details, material descriptions, fabrication methods, dimensions of
28 individual components and profiles, hardware, finishes, and operating instructions for each type of aluminum
window indicated.

30 SHOP DRAWINGS: Include plans, elevations, sections, details, hardware, attachments to other Work, and
operational clearances.

32 MAINTENANCE DATA: For operable window sash, operating hardware, weatherstripping, and finishes to include
34 in maintenance manuals.

36 QUALITY ASSURANCE

38 SOURCE LIMITATIONS: Obtain aluminum windows through one source from a single manufacturer.

40 MOCKUP: Build to verify color selections made and to demonstrate aesthetic effects and qualities of materials and
42 execution.

44 PROJECT CONDITIONS

46 FIELD MEASUREMENTS: Verify aluminum window openings by field measurements before fabrication and
48 indicate measurements on Shop Drawings. Where field measurements cannot be made without delaying the Work,
establish opening dimensions and proceed with fabricating aluminum windows without field measurements.
50 Coordinate wall construction to ensure that actual opening dimensions correspond to established dimensions.

52 WARRANTY

54 SPECIAL PROJECT WARRANTY: Manufacturer's standard form in which manufacturer agrees to repair or
56 replace aluminum windows that fail in materials or workmanship within specified warranty period. Failures include,
but are not limited to, the following:

58 Failure to meet performance requirements.

Structural failures including excessive deflection.

60 Water leakage, air infiltration, or condensation.

Faulty operation of movable sash and hardware.

62 Deterioration of metals, metal finishes, and other materials beyond normal weathering.

64 Insulating glass failure.

66 WARRANTY PERIOD: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2 AVAILABLE MANUFACTURERS: Subject to compliance with requirements, manufacturers offering products
4 that may be incorporated into the Work include, but are not limited to, the following:

- 6 Acorn Window Systems.
- 8 Boyd Aluminum Manufacturing.
- 10 EFCO Corporation.
- 12 Mannix; a Division of Interstate Window Corp.
- 14 Peerless Products, Inc.
- 16 TRACO.
- 18 Wausau Window and Wall Systems.
- 20 Winco Manufacturing Co.

22 MATERIALS, GENERAL

24 ALUMINUM EXTRUSIONS: 6063-T6 alloy extrusions or as otherwise recommended by aluminum window manu-
26 facturer for strength, corrosion resistance, and application of required finish, but not less than 22,000-psi ultimate
28 tensile strength, not less than 16,000-psi minimum yield strength, and as follows:

- 30 Minimum wall thickness for window frame sill members: 0.078"
- 32 Minimum wall thickness for all other members (including frame and sash): 0.062"

34 FASTENERS: Aluminum, nonmagnetic stainless steel, or other materials warranted by manufacturer to be
36 noncorrosive and compatible with aluminum window members, trim, hardware, anchors, and other components.

38 Cadmium-plated steel fasteners are not permitted.

40 ANCHORS, CLIPS, AND ACCESSORIES: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron
42 complying with ASTM B 633 for SC 3 severe service conditions; provide sufficient strength to withstand design
44 pressure indicated.

46 REINFORCING MEMBERS: Aluminum, nonmagnetic stainless steel, nickel/chrome-plated steel complying with
48 ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for
50 SC 3 severe service conditions; provide sufficient strength to withstand design pressure indicated

52 SLIDING-TYPE WEATHER STRIPPING: Provide woven-pile weather stripping of wool, polypropylene, or nylon
54 pile and resin-impregnated backing fabric. Comply with AAMA Standard. Provide weather stripping with integral
56 barrier fin or fins of semirigid, polypropylene sheet or polypropylene-coated material.

58 REPLACEABLE WEATHER SEALS: Comply with AAMA Standard.

60 SEALANT: For sealants required within fabricated windows, provide window manufacturer's standard, permanently
62 elastic, nonshrinking, and nonmigrating type recommended by sealant manufacturer for joint size and movement.

64 HARDWARE

66 PROVIDE MANUFACTURER'S STANDARD hardware fabricated from aluminum, stainless steel, carbon steel
68 complying with AAMA 907, or other corrosion-resistant material compatible with aluminum; designed to smoothly
operate, tightly close, and securely lock aluminum windows and sized to accommodate sash or ventilator weight and
dimensions. Cadmium-plated hardware is not permitted. Do not use aluminum in frictional contact with other
metals.

DOUBLE-HUNG WINDOWS: Provide the following operating hardware:

- 66 Counterbalancing Mechanism: Comply with AAMA 902, providing concealed spiral-tube type sash
68 balance of size and capacity to hold sash stationary at any open position.
- 70 Sash Balances: Two per sash.
- 72 Handle: Continuous, integral extruded lift handle on upper sash and the meeting rail of the lower sash for
74 operation of the sash.
- 76 Sash Lock: One (1) each cam-action sweep lock and keeper at meeting rails typically, two (2) on units 40
78 inches wide or more.
- 80 Tilt Lock: Design windows and provide with tamperproof tilt latch and pivot bar hardware to permit tilting
82 of sash inward for cleaning both sides of sash from interior.
- 84 Hold-Open Device: Automatic-locking hold-open arms or stay bars; designed to permit sash operation for
86 inside cleaning of outside glass face; two per ventilator.

88 INSECT SCREENS: Design windows and hardware to accommodate screens in a tight-fitting, removable
arrangement, with a minimum of exposed fasteners and latches. Locate screens on outside of window and provide
for each operable exterior sash or ventilator.

2 ALUMINUM TUBULAR FRAME SCREENS: Comply with SMA 1004, "Specifications for Aluminum Tubular
3 Frame Screens for Windows," Architectural C-24 class. C. Aluminum Insect Screen Frames: Manufacturer's
4 standard aluminum alloy complying with SMA 1004. Fabricate frames with mitered or coped joints, concealed
5 fasteners, and removable PVC spline/anchor concealing edge of frame. Aluminum Tubular Framing Sections and
6 Cross Braces: Roll formed from aluminum sheet with minimum wall thickness as required for class indicated.
7 Provide manufacturer's standard finish.

8 GLASS-FIBER MESH SCREEN FABRIC: 20-by-20 mesh of PVC-coated, glass-fiber threads; woven and fused to
9 form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration in the
10 following color. Comply with ASTM D 3656.

12 ACCESSORIES

14 ALUMINUM WINDOW TRIM: Provide edge trim units, including brick molds, mullion covers; and head, jamb,
15 and sill extenders to match finish of window as indicated on the Drawings.

16 INTEGRAL VENTILATING SYSTEM/DEVICE: Where indicated, provide weather-stripped, adjustable,
17 horizontal, fresh-air vent, with a free airflow slot for full width of window sash by approximately 1 inch wide when
18 open, complying with AAMA/NWWDA 101/I.S.2. Equip vent bar with an integral insect screen, removable for
19 cleaning.

22 FABRICATION

24 FABRICATE ALUMINUM WINDOWS, in sizes indicated, that comply with referenced standard for performance
25 class and performance grade indicated. Include a complete system for assembling components and anchoring
26 windows.

27 COPE, MILL, AND FIRMLY JOIN all frame and sash members using stainless steel screws into extruded
28 aluminum integral screw ports. Each frame corner joint shall be secured with screws.
29 Nominal frame depth shall be 3-1/4".

32 THERMALLY IMPROVED CONSTRUCTION: Fabricate windows with an integral, concealed, low-conductance
33 thermal barrier; located between exterior materials and window members exposed on interior side; in a manner that
34 eliminates direct metal-to-metal contact. Provide thermal-break construction that has been in use for not less than
35 three years and has been tested to demonstrate resistance to thermal conductance and condensation and to show
36 adequate strength and security of glass retention.

38 WEATHER STRIPPING: Provide full-perimeter weather stripping for each operable sash and ventilator. Provide
39 double-row weather stripping at vertically pivoted window units.

42 WEEP HOLES: Provide weep holes and internal passages to conduct infiltrating water to exterior.

44 MULLIONS: Provide mullions and cover plates where indicated on the Drawings, matching window units,
45 complete with anchors for support to structure and installation of window units. Allow for erection tolerances and
46 provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide
47 mullions and cover plates capable of withstanding design loads of window units.

48 SASH: Provide all horizontal sash members of hollow tubular design with a minimum depth of 1", and with a
49 minimum glazing leg of 5/8". Corner joints shall be of telescoping design to provide rigidity. Screw assemble with
50 channel glazed construction for ease and economy of re-glazing using existing materials. Both sash units must be
51 operable and must be able to hold stationary in any desired position.

54 GLAZING

56 GLASS AND GLAZING MATERIALS: Refer to Division 8 Section "Glazing" for glass units and glazing
57 requirements applicable to glazed aluminum window units. Comply with window manufacturer's requirements, and
58 with applicable provisions of AAMA/NWWDA 101/I.S.2.

60 CONTRACTOR'S OPTION FOR FACTORY-GLAZED FABRICATION: Glaze aluminum windows in the factory
61 if practical and possible for applications indicated. Comply with requirements in Division 8 Section "Glazing"

64 FINISHES

66 COMPLY WITH NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations
67 for applying and designating finishes. Finish designations prefixed by AA comply with the system established by the
68 Aluminum Association for designating aluminum finishes.

2 CLASS II, COLOR ANODIC FINISH: AA-M12C22A32/A34 (Mechanical Finish: nonspecular as fabricated;
3 Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, integrally colored or
4 electrolytically deposited color coating 0.010 mm or thicker) complying with AAMA 611.

COLOR: As selected by Architect from the full range of industry colors and color densities.

6 **PART 3 - EXECUTION**

8 **EXAMINATION**

10 EXAMINE OPENINGS, substrates, structural support, anchorage, and conditions, with Installer present, for
12 compliance with requirements for installation tolerances; rough opening dimensions; levelness of sill plate;
13 coordination with wall flashings, vapor retarders, and other built-in components; operational clearances; and other
14 conditions affecting performance of work.

Masonry Surfaces: Visibly dry and free of excess mortar, sand, and other construction debris.

16 Metal Surfaces: Dry; clean; free of grease, oil, dirt, rust, corrosion, and welding slag; without sharp edges
17 or offsets at joints.

18 PROCEED WITH INSTALLATION only after unsatisfactory conditions have been corrected.

20 **INSTALLATION**

22 COMPLY WITH MANUFACTURER'S written instructions for installing windows, hardware, accessories, and
23 other components; Drawings; and Shop Drawings.

24 INSTALL WINDOWS level, plumb, square, true to line, without distortion or impeding thermal movement,
25 anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent
26 construction.

28 SET SILL MEMBERS IN BED OF SEALANT or with gaskets, as indicated, for weathertight construction.

30 INSTALL WINDOWS AND COMPONENTS to drain condensation, water penetrating joints, and moisture
31 migrating within windows to the exterior.

34 SEPARATE ALUMINUM AND OTHER CORRODIBLE SURFACES from sources of corrosion or electrolytic
35 action at points of contact with other materials.

38 **ADJUSTING**

40 ADJUST OPERATING SASHES and ventilators, screens, hardware, and accessories for a tight fit at contact points
41 and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

44 **PROTECTION AND CLEANING**

46 PROTECT WINDOW SURFACES from contact with contaminating substances resulting from construction
47 operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces
48 during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating
49 substances do contact window surfaces, remove contaminants immediately according to manufacturer's written
50 recommendations.

52 CLEAN ALUMINUM SURFACES immediately after installing windows. Avoid damaging protective coatings and
53 finishes. Remove excess sealants, glazing materials, dirt, and other substances.

54 CLEAN GLASS immediately after installing. Comply with manufacturer's written recommendations for final
55 cleaning and maintenance. Remove nonpermanent labels and clean surfaces.

58 REMOVE AND REPLACE GLASS that has been broken, chipped, cracked, abraded, or damaged during
59 construction period.

60 **END OF SECTION 08 51 13**

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide aluminum-clad wood windows where indicated on the Drawings, as specified herein,
8 and as necessary for complete installation. This Section includes the following aluminum-clad wood-framed
10 window product types:
 Double-hung windows.
 Decorative circle-head non-operative fixed windows.

12 RELATED SECTIONS include the following:
14 Division 8 Section "Glazing" for glazing requirements for wood windows, including those specified to be
16 factory glazed.

18 PERFORMANCE REQUIREMENTS:

20 WINDOW UNITS SHALL MEET Rating H-LC30 specifications in accordance with AMMA/WDMA 101/I.S.-2.

22 WINDOW UNIT AIR LEAKAGE, when tested in accordance with ASTM E 283 at 1.57 psf. (25 mph), shall be 0.3
24 cfm per square foot of frame or less. No water penetration through window when tested in accordance with ASTM E
26 547 under static pressure of 4.5 psf. (42 mph) after 4 cycles of 5 minutes each, with water being applied at a rate of 5
28 gallons per hour per square foot.

30 WINDOW ASSEMBLY SHALL WITHSTAND positive and negative pressures of 45 psf. acting normal to the
32 plane of the window. Structural tests shall be conducted in accordance with ASTM E 330.

34 SUBMITTALS

36 PRODUCT DATA: Include construction details, material descriptions, fabrication methods, dimensions of
38 individual components and profiles, hardware, finishes, and operating instructions for each type of wood window
indicated.

40 SHOP DRAWINGS: Indicate pertinent dimensioning, general construction, component connections and locations,
42 anchorage methods and locations, hardware locations and installation details.

44 MAINTENANCE DATA: For operable window sash, operating hardware, weather stripping and finishes to include
46 in maintenance manuals.

48 QUALITY ASSURANCE

50 SOURCE LIMITATIONS: Obtain wood windows through one source from a single manufacturer.

52 PRODUCT OPTIONS: Drawings indicate size, profiles, and dimensional requirements of wood windows and are
54 based on the specific system indicated. Refer to Division 1 Section "Product Requirements." Do not modify
56 intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are
proposed, submit comprehensive explanatory data to Architect for review.

58 FENESTRATION STANDARD: Comply with AAMA/NWWDA 101/I.S.2, "Voluntary Specifications for
Aluminum, Vinyl (PVC) and Wood Windows and Glass Doors," for minimum standards of performance, materials,
components, accessories, and fabrication unless more stringent requirements are indicated.

60 GLAZING PUBLICATIONS: Comply with published recommendations of glass manufacturers and GANA's
62 "Glazing Manual" unless more stringent requirements are indicated.

64 DELIVERY, STORAGE AND HANDLING

66 DELIVER MATERIALS to job site in manufacturer's or distributor's packaging undamaged, complete with
installation instructions.

STORE OFF GROUND, under cover, protected from weather and construction activities.

PART 2 - PRODUCTS

MANUFACTURED WINDOW UNITS: Drawings are based on use of “Designer-Series” Clad Double-Hung units as manufactured by Pella Corporation. Equivalent factory-assembled aluminum-clad wood window products with exterior aluminum muntin bars, sash installed in the frame, with sash able to pivot between jambs (without removal for cleaning) and meeting other requirements of this Specification as manufactured by the following entities are also acceptable:

OR

ALUMINUM-CLAD WOOD WINDOWS: Drawings are based on use of “Clad Ultimate” or “Clad Ultimate Magnum” series units custom-fabricated to fit openings indicated, by Marvin Windows and Doors. Equivalent factory-assembled aluminum-clad wood window products with exterior aluminum muntin bars, and meeting other requirements of this Specification as manufactured by the following entities are also acceptable:

- BiltBest Windows and Patio Doors.
- Caradco Window Corp.
- Jeld-Wen, Inc.
- Hurd Millwork Co.
- Marvin Windows and Doors.
- Peachtree Doors and Windows; Nortek, Inc.
- Weather Shield Mfg., Inc.

CIRCLEHEAD WINDOWS: Provide units matching window units above by same manufacturer, in size and profiles as indicated in the Drawings.

CUSTOM EXTERIOR MUNTIN BARS: Provide extruded aluminum bars, pinned at joints and fitted to outside of sash with aluminum clips. Finish to match window cladding.

HARDWARE

BALANCES: Galvanized block-and-tackle balances connected to sash with polyester cord and concealed within the frame.

LOCK: Self-aligning recessed sash lock factory-installed. Two sash locks on units with 36-3/4 inches frame width and greater. Finish shall be brass-plated.

LIFT: Sash lift furnished for field installation. Two lifts on units with 36-3/4 inches frame width and greater. Finish shall be solid brass.

TOLERANCES

PROVIDE WINDOWS to accommodate the following opening tolerances:

- Vertical dimensions between high and low points: plus 1/4 inch or minus zero inches.
- Width dimensions: plus 1/4 inch or minus zero inches.
- Building columns or masonry openings: plus or minus 1/4 inch from plumb.

FINISH

2-COAT FLUOROPOLYMER FINISH: Manufacturer's standard two-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2604. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

Color: Custom formulated to match adjacent anodized aluminum finishes

POLYESTER ENAMEL FINISH: finish exterior extruded aluminum surfaces by cleaning and etching aluminum surface of oxides, pretreat with chrome phosphate conversion coating, pretreat with chromic acid sealer/rinse, and apply top-coat with baked-on polyester enamel.

EXTERIOR FINISH COLOR: as selected by Architect from manufacturer’s full range, and may include up to three (3) separate colors for the project.

INTERIOR FINISH: Factory-primed with one coat acrylic latex.

PART 3 - EXECUTION

2 EXAMINATION: Examine openings, substrates, structural support, anchorage, and conditions, with Installer
4 present, for compliance with requirements for installation tolerances; rough opening dimensions; levelness of sill
6 plate; coordination with wall flashings, vapor retarders, and other built-in components; and other conditions
8 affecting performance of work.

INSTALLATION

8 COMPLY WITH MANUFACTURER'S WRITTEN INSTRUCTIONS for installing windows, hardware,
10 accessories, and other components; Drawings; and Shop Drawings.

12 INSTALL WINDOWS level, plumb, square, true to line, without distortion or impeding thermal movement,
14 anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent
16 construction.

16 SET SILL MEMBERS in bed of sealant or with gaskets, as indicated, for weathertight construction.

18 SEPARATE ALUMINUM and other corrodible surfaces from sources of corrosion or electrolytic action at points of
20 contact with other materials by complying with requirements specified in "Dissimilar Materials" Paragraph in
22 Appendix B in AAMA/NWWDA 101/I.S.2.

22 ADJUST OPERATING SASHES and ventilators, screens, hardware, and accessories for a tight fit at contact points
24 and weather stripping for smooth operation and weathertight closure. Lubricate hardware and moving parts.

24 PROTECT WINDOW SURFACES from contact with contaminating substances resulting from construction
26 operations. In addition, monitor window surfaces adjacent to and below exterior concrete and masonry surfaces
28 during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating
30 substances do contact window surfaces, remove contaminants immediately according to manufacturer's written
32 recommendations.

30 CLEAN EXPOSED SURFACES immediately after installing windows. Avoid damaging protective coatings and
32 finishes. Remove excess sealants, glazing materials, dirt, and other substances.

34 REMOVE AND REPLACE GLASS that has been broken, chipped, cracked, abraded, or damaged during
36 construction period.

END OF SECTION 08 52 13

1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide door hardware where indicated on the Drawings, as specified herein, and as necessary
8 for complete installation. This Section includes items known commercially as finish or door hardware that are
required for swing, sliding, and folding doors, except special types of unique hardware specified in the same
sections as the doors and door frames on which they are installed. This Section includes the following:

10 "Knox"-Box(es)
Hinges.
12 Lock cylinders and keys.
Lock and latch sets.
14 Bolts.
Push/pull units.
16 Closers.
Miscellaneous door control devices.
18 Door trim units.
Protection plates.
20 Weatherstripping for exterior doors.
Astragals or meeting seals on pairs of doors.
22 Thresholds.

24 RELATED SECTIONS: The following Sections contain requirements that relate to this Section:
Division 8 Section "Steel Doors and Frames" for silencers integral with hollow metal frames.

26 PRODUCTS FURNISHED BUT NOT INSTALLED under this Section include:
28 Final replacement cores and keys to be installed by Owner.

REFERENCED STANDARDS:

32 ACCESSIBILITY STANDARDS: COMPLY WITH ICC/ANSI A117.1 "Accessible and Usable Buildings and
34 Facilities" (most recent edition) and with requirements of the federally required Americans with Disabilities Act
(ADA), including but not limited to the following:

36 Provide an accessible clear-floor space at all accessible, operational door hardware
Accessible hardware to be operable with one (1) hand in a single motion,
38 Accessible hardware to be operable without tight grasping, pinching, or twisting of the wrist.
Maximum operational force for accessible hardware: five (5.0) pounds (except at exterior doors)
40 Allowable height limits for accessible, operational door hardware:
lowest height above grade or floor: 1'-3" (15")
42 highest height above grade or floor: 4'-0" (48")

SUBMITTALS

46 PRODUCT DATA including manufacturers' technical product data for each item of door hardware, installation
48 instructions, maintenance of operating parts and finish, and other information necessary to show compliance with
requirements.

50 FINAL HARDWARE SCHEDULE coordinated with doors, frames, and related work to ensure proper size,
52 thickness, hand, function, and finish of door hardware. Based on hardware indicated, organize schedule into
"hardware sets" indicating complete designations of every item required for each door or opening. Include the
54 following information:

56 Type, style, function, size, and finish of each hardware item.
Name and manufacturer of each item.
Fastenings and other pertinent information.
58 Location of each hardware set cross referenced to indications on Drawings both on floor plans and in door
and frame schedule.
60 Explanation of all abbreviations, symbols, and codes contained in schedule.
Mounting locations for hardware.
62 Door and frame sizes and materials.
Keying information.
64

QUALITY ASSURANCE

2 SINGLE SOURCE RESPONSIBILITY: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.)
3 from a single manufacturer.

4 SUPPLIER QUALIFICATIONS: A recognized architectural door hardware supplier, with warehousing facilities in
5 the Project's vicinity, that has a record of successful in-service performance for supplying door hardware similar in
6 quantity, type, and quality to that indicated for this Project and that employs an experienced architectural hardware
7 consultant (AHC) who is available to Owner, Architect, and Contractor, at reasonable times during the course of the
8 Work, for consultation.

10 REQUIRE HARDWARE SUPPLIER TO MEET WITH THE OWNER'S REPRESENTATIVE to verify
11 requirements of specified hardware items indicated herein before ordering, and to determine the final keying
12 requirements. Confirm decisions made in writing, and submit to Architect for record within three (3) days of
13 meeting. Allow for a minimum of two (2) meetings, each to take not less than THREE (3) hours each, with all
14 meetings to be held at the project site (unless otherwise agreed to with Owner's representative).

16 REFER TO DRAWINGS for special requirements, manufacturers, etc.
18

20 PRODUCT HANDLING

22 TAG EACH ITEM OR PACKAGE SEPARATELY with identification related to final hardware schedule, and
23 include basic installation instructions with each item or package. Packaging of door hardware is responsibility of
24 supplier. As material is received by hardware supplier from various manufacturers, sort and repackage in containers
25 clearly marked with appropriate hardware set number to match set numbers of approved hardware schedule. Two or
26 more identical sets may be packed in same container.

28 INVENTORY DOOR HARDWARE jointly with representatives of hardware supplier and hardware installer until
29 each is satisfied that count is correct.

30 DELIVER INDIVIDUALLY PACKAGED DOOR HARDWARE ITEMS promptly to place of installation (shop or
31 Project site).

34 PROVIDE SECURE LOCK-UP for door hardware delivered to the Project, but not yet installed. Control handling
35 and installation of hardware items that are not immediately replaceable so that completion of the Work will not be
36 delayed by hardware losses both before and after installation.

38 MAINTENANCE

40 MAINTENANCE TOOLS AND INSTRUCTIONS: Furnish a complete set of specialized tools and maintenance
41 instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door
42 hardware.
44

46 PART 2 - PRODUCTS

48 MATERIALS AND FABRICATION

50 MANUFACTURER'S NAME PLATE: Do not use manufacturers' products that have manufacturer's name or trade
51 name displayed in a visible location (omit removable nameplates) except in conjunction with required fire-rated
52 labels and as otherwise acceptable to Architect. Manufacturer's identification will be permitted on rim of lock
53 cylinders only.

54 BASE METALS: Produce hardware units of basic metal and forming method indicated, using manufacturer's
55 standard metal alloy, composition, temper, and hardness, but in no case of lesser (commercially recognized) quality
56 than specified for applicable hardware units by applicable ANSI/BHMA A156 series standards for each type of
57 hardware item and with ANSI/BHMA A156.18 for finish designations indicated. Do not furnish "optional" materials
58 or forming methods for those indicated, except as otherwise specified.

60 FASTENERS: Provide hardware manufactured to conform to published templates, generally prepared for machine
61 screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as
62 specifically indicated.

64 FURNISH SCREWS FOR INSTALLATION with each hardware item. Provide Phillips flat-head screws except as
65 otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in
66 surfaces of other work, to match finish of this other work as closely as possible including "prepared for paint"
67 surfaces to receive painted finish.
68

PROVIDE CONCEALED FASTENERS for hardware units that are exposed when door is closed except to the extent no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless their use is the only means of reinforcing the work adequately to fasten the hardware securely. Where thru-bolts are used as a means of reinforcing the work, provide sleeves for each thru-bolt or use sex screw fasteners.

HINGES, BUTTS, AND PIVOTS

Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

Screws: Provide Phillips flat-head screws complying with the following requirements:
For metal doors and frames install machine screws into drilled and tapped holes.
Finish screw heads to match surface of hinges or pivots.

Hinge Pins: Non-removable or non-rising (NRP) typically with flat button tips and matching plug, finished to match leaves.

Number of Butt Hinges: Provide number of hinges indicated but not less than 3 hinges per door leaf for doors 90 inches or less in height and one additional hinge for each 30 inches of additional height.

Acceptable Manufacturers:

Hager Hinge Co.

McKinney Products Co.

PBB (specified manufacturer for butt hinges)

Pemko Manufacturing Co., Inc (continuous geared hinges)

Select Products Limited (specified manufacturer for continuous geared hinges)

Stanley Hardware, Div. Stanley Works.

LOCK CYLINDERS AND KEYING

Review the keying system with the Owner and provide the type required (master, grandmaster or great-grandmaster).

Metals: Construct lock cylinder parts from brass or bronze, stainless steel, or nickel silver.

Comply with Owner's instructions for masterkeying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.

Permanently inscribe each key with number of lock that identifies cylinder manufacturer's key symbol, and notation, "DO NOT DUPLICATE."

Key Material: Provide keys of nickel silver only.

Key Quantity: Furnish 3 change keys for each lock, 5 master keys for each master system, and 5 grandmaster keys for each grandmaster system.

Furnish one extra blank for each lock.

Deliver keys to Owner.

Acceptable Manufacturers:

Corbin & Russwin Architectural Hardware, Div. Black & Decker Corp.

Sargent Manufacturing Company.

Schlage Lock, Div. Ingersoll-Rand Door Hardware Group (specified cylinder manufacturer)

Yale Security Inc.

KEY CONTROL SYSTEM: Provide a key control system including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index.

EMERGENCY KEY BOX: Knox-Box 3200 Series with hinged door, #3270 Recessed or #3266 Surface Mounted as appropriate, as manufactured by the Knox Company (www.knoxbox.com) - no substitutions permitted

LOCKS, LATCHES, AND BOLTS

Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set, unless otherwise indicated.

Provide flat lip strikes for locks with 3-piece, antifriction latchbolts as recommended by manufacturer.

Provide extra long strike lips for locks used on frames with applied wood casing trim.

Provide recess type top strikes for bolts locking into head frames, unless otherwise indicated.

Provide dust-proof strikes for foot bolts, except where special threshold construction provides nonrecessed strike for bolt.

Lock Throw: Provide 5/8-inch minimum throw of latch on pairs of doors. Comply with UL requirements for throw of bolts and latch bolts on rated fire openings.

Provide 1/2-inch minimum throw of latch for other bored and preassembled types of locks and 3/4-inch minimum throw of latch for mortise locks. Provide 1-inch minimum throw for all dead bolts.

Flush Bolt Heads: Minimum of 1/2-inch- diameter rods of brass, bronze, or stainless steel with minimum 12-inch- long rod for doors up to 84 inches in height. Provide longer rods as necessary for doors exceeding 84 inches in height.

Exit Device Dogging: Except on fire-rated doors where closers are provided on doors equipped with exit devices, equip the units with keyed dogging device to keep the latch bolt retracted, when engaged.

Acceptable Manufacturers for Locks:

Cal-Royal Products Inc (specified manufacturer)

Corbin & Russwin Architectural Hardware, Div. Black & Decker Corp.

PDQ Manufacturing

Sargent Manufacturing Company.
Schlage Lock, Div. Ingersoll-Rand Door Hardware Group (specified cylinder manufacturer)
Yale Security Inc.

Acceptable Manufacturers for Bolts:
H. B. Ives, A Harrow Company.
Quality Hardware Mfg. Co., Inc.; Div. Newman Tonks, Inc.
Stanley Hardware, Div. Stanley Works.
Von Duprin, Div. Ingersoll-Rand Door Hardware Group.
Yale Security Inc.

PUSH/PULLS, DOOR TRIM AND FLATGOOD UNITS

Fasteners: Provide manufacturer's standard exposed fasteners for door trim units consisting of either machine screws or self-tapping screws, thru-bolted for matched pairs but not for single units.
Fabricate edge trim of stainless steel to fit door thickness in standard lengths or to match height of protection plates.
Fabricate protection plates not more than 1-1/2 inches less than door width on hinge side and not more than 1/2 inch less than door width on pull side by height indicated.
Metal Plates: Stainless steel, 0.050 inch (U.S. 18 gage).
Acceptable Manufacturers:
Brookline Industries, Div. Yale Security Inc.
Hager Hinge Co.
H. B. Ives, A Harrow Company.
Rockwood (specified manufacturer)

CLOSERS AND DOOR CONTROL DEVICES

Size of Units: Except as otherwise specifically indicated, comply with the manufacturer's recommendations for size of door control unit depending on size of door, exposure to weather, and anticipated frequency of use.
Provide parallel arms for all overhead closers, except as otherwise indicated, with closer unit one size larger than recommended for use with standard arms
Access-Free Manual Closers: Provide adjustable units complying with ANSI A117.1 accessibility standards.
Provide black resilient parts for exposed bumpers.
Provide units with high-strength, cast-iron bodies (aluminum body is not acceptable), tamper resistant regulating screws for speed, back-check and latch speed, and with "all-temperature" fluid:
Acceptable Manufacturers:
Cal-Royal Products, Inc (specified manufacturer)
LCN, Div. Ingersoll-Rand Door Hardware Group.
Sargent Manufacturing Company – Series 281 "Powerglide"

DOOR STRIPPING, SEALS, & THRESHOLDS

Provide continuous weatherstripping on exterior doors and smoke, light, or sound seals on interior doors typically. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
Replaceable Seal Strips: Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from stocks maintained by manufacturer.
Weatherstripping at Jambs and Heads: Provide bumper-type resilient insert and metal retainer strips, surface applied unless shown as mortised or semimortised.
Weatherstripping at Door Bottoms: Provide threshold consisting of contact-type resilient insert and metal housing of design and size indicated.
Acceptable Manufacturers:
National Guard Products, Inc. (Specified manufacturer)
Pemko Manufacturing Co., Inc.
Reese
Zero

HARDWARE FINISHES

MATCH ITEMS to the manufacturer's standard color and texture finish for the latch and lock sets (or push-pull units if no latch or lock sets).
PROVIDE FINISHES THAT MATCH those established by BHMA or, if none established, match the Architect's sample.
PROVIDE QUALITY OF FINISH, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware.

PROVIDE PROTECTIVE LACQUER COATING on all exposed hardware finishes of brass, bronze, and aluminum, except as otherwise indicated. The suffix "-NL" is used with standard finish designations to indicate "no lacquer."

PART 3 - EXECUTION

INSTALLATION

MOUNT HARDWARE UNITS at heights indicated in following applicable publications, except as specifically indicated or required to comply with governing regulations and except as otherwise directed by Architect.

"Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute.

INSTALL EACH HARDWARE ITEM in compliance with the manufacturer's instructions and recommendations. Where cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation or application of surface protection with finishing work specified in the Division 9 Sections. Do not install surface-mounted items until finishes have been completed on the substrates involved.

SET UNITS LEVEL, PLUMB, AND TRUE to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

DRILL AND COUNTERSINK UNITS that are not factory prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

SET THRESHOLDS FOR EXTERIOR DOORS in full bed of butyl-rubber mastic sealant complying with requirements specified in Division 7 Section "Joint Sealers."

WEATHERSTRIPPING AND SEALS: Comply with manufacturer's instructions and recommendations to the extent installation requirements are not otherwise indicated.

ADJUSTING, CLEANING, AND DEMONSTRATING

ADJUST AND CHECK each operating item of hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly or as intended for the application made. Where door hardware is installed more than one month prior to acceptance or occupancy of a space or area, return to the installation during the week prior to acceptance or occupancy and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

CLEAN ADJACENT SURFACES soiled by hardware installation.

INSTRUCT OWNER'S PERSONNEL in the proper adjustment and maintenance of door hardware and hardware finishes.

HARDWARE SCHEDULE

EMERGENCY KEY ACCESS BOX: Provide ONE (1) unit per building typically at fire-sprinkler control valve and alarm control access door and at location and height as approved by local fire-department officials having jurisdiction. Coordinate keying of cylinders with local Fire Department officials.

ROOFTOP ACCESS DOORS: Provide minimum 2 stainless-steel hinges, lockset with cylinder master-keyed to building system, full-width overhead rain-drip, door bottom drip/sweep, and weatherstripping seal all around access door unit.

SOFFIT ACCESS DOORS: Provide cylinder master-keyed to building system.

ALL DOORS:

DOOR BUMPERS: Provide 3 each (or 1 at each leaf of door pairs) resilient door bumpers for either hollow-metal or wood door frames.

TYPICAL HARDWARE SCHEDULE:

2

REFERENCED MANUFACTURERS

AR	Adams Rite
GJ	Glynn Johnson
LCN	LCN
NGP	National Guard Products
RO	Rockwood

SCHEDULE ABBREVIATIONS

AL	Aluminum
DH	Door Height
DR	Door
DW	Door Width
FR	Frame
HM	Hollow Metal
LBR	Less Bottom Rod (on exit devices)
LDW	Less Door Width
NRP	Non Removable Pins
PR	Pair (item or door-leaf quantity – Single if not noted)
WD	Wood
WS	WeatherStripping

TYPICAL FINISHES (Unless Noted Otherwise)

626	Satin Chrome/brass (painted plastic on closers)
630	Satin Stainless Steel (push/pulls & plates)

TYPICAL KEYING (at locksets and panic devices):

7-pin interchangeable core (typical)
Or Owner approved equal

#: *Item Description:* *MFGR:* *Mfgr's Product # or Reference, – Special Notes:*

HARDWARE SET #	1	Single Exterior AL DR w/ AL FR (min at all AL doors):
3	Pivots	By Door Manufacturer – match color of door and frame
1	Push / Pull Set	By Door Manufacturer
1	Deadbolt w/ inside lever	By Door Manufacturer – match color of door and frame
1	Cylinder	
2	Closer w/ stop	LCN 4040 +3049-CNS (Cush-N-Stop arm)
1	Threshold	NGP 896N – 1/2” H x 5” ADA panic/saddle with seal (3/8” undercut)
1	Accessibility Decal	4” x 4” blue decal – mount at 60” AFF adjacent to door strike Integral weather-seals by Door/frame manufacturer

HARDWARE SET #	2	PR Exterior AL DR w/ AL FR (min at all PR AL doors):
6	Pivots	By Door Manufacturer – match color of door & frame
2	Push/Pull Set	By Door Manufacturer
1	3-point Lever Deadbolt	By Door Manufacturer – match color of door and frame
1	Cylinder	
2	Closer w/ stop & hold	LCN 4040 +3049-CNS (Cush-N-Stop arm)
1	Threshold	NGP 896N – 1/2” H x 5” ADA panic/saddle with seal
1	Accessibility Decal	4” x 4” blue decal – mount at 60” AFF adjacent to door Integral weather-seals by door/frame manufacturer

HARDWARE SET #	3	Typical Exterior DR with outside entry trim:
1	Continuous Hinge	SEL SL11HD
1	Cylinder Lockset	PDQ GT (grade 1) x BSN lever x 116 (Entrance Function) x 626
1	Closer w/ stop & hold	LCN 4040 +3049-CNS (Cush-N-Stop arm)
1	Kickplate	RO K1050 x 8” H x 2”LDW x B4E x 626
1	Weather-stripping	NGP 172NA – all around jambs and head
1	Rain Drip	NGP 16A x DW+4” – mount to frame above door – field paint FR color
1	Door Bottom / sweep	NGP 101VA
1	Threshold	NGP 896N – 1/2” H x 5” ADA panic/saddle with seal
1	Lockguard	RO 320
1	Wall Stop	RO 409

HARDWARE SET #	4	TYPICAL REAR-SERVICE DOOR
		Same as set above, but replace “Entry” function lockset with the following:
1	Cylinder Lockset	PDQ GT (grade 1) x BSN lever x 115 (Storeroom Function)

HARDWARE SET #	5	ROOF ACCESS HATCHES (typical throughout project):
1	Padlock	With master-keyed cylinder

HARDWARE SET #	6	CYLINDER ONLY (at sliding, access, or overhead doors):
1	Cylinder	Coordinate type with applicable unit

HARDWARE SET #	7	Typical Interior DR (minimum at all interior drs):
3	Butt Hinges	PBB BB21 x 4.5 x 4.5
1	Cylinder Lockset	PDQ GT (grade 1) x BSN lever x IC core x 116 (Entrance Function) x 626
1	Closer	LCN 4041
1	Kickplate	RO K1050 x 8” H x 2”LDW x B4E x 626

DOOR HARDWARE

SECTION 08 71 00

Box – New Longview, Lot 44

Klover Project No. 23150.001

<i>#:</i>	<i>Item Description:</i>	<i>MFR:</i>	<i>Mfgr's Product # or Reference, – Special Notes:</i>
1	Wall Stop	RO	409
3	Frame Silencers		(for HM or wood frame as applicable)

HARDWARE SET # 8		<u>Interior Service/Storeroom DR (always locked):</u>	
Same as set above, but replace lockset with the following:			
1	Cylinder Lockset	PDQ	GT (grade 1) x BSN lever x 115 (Storeroom Function) x 626

END OF SECTION 08 71 00

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide glazing where indicated on the Drawings, as specified herein, and as necessary for
8 complete installation. This Section includes glazing for windows and doors.

PERFORMANCE REQUIREMENTS

12 WATERTIGHT AND AIRTIGHT INSTALLATION of each glass product is required, except as otherwise shown.
14 Each installation must withstand normal temperature changes, wind loading, impact loading (for operating sash and
16 doors), without failure including loss or breakage of glass, failure of sealants or gaskets to remain watertight and
18 airtight, deterioration of glazing materials and other defects in the work.

GLASS DESIGN: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses
18 by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal 6 mm
20 (1/4 inch) thickness minimum, but not less than thicknesses and in strengths (annealed or heat treated) required to
22 meet or exceed the following criteria. Select minimum glass thicknesses to comply with ASTM E 1300, according to
24 the following requirements:

26 Specified Design Wind Load: Determine design wind loads applicable to Project from basic wind speed
28 indicated on the Drawings in miles per hour at 33 feet above grade, according to ASCE 7,
30 "Minimum Design Loads for Buildings and Other Structures": Section 6.4.2, "Analytic
32 Procedure," based on mean roof heights above grade indicated on Drawings – with a minimum .
34 uniform pressure loading of 25 PSF inward and 25 psf outward.

36 Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15
38 degrees off vertical and under wind action.

Load Duration: 60 seconds or less.

40 THERMAL MOVEMENTS: Provide glazing that allows for thermal movements resulting from the following
42 maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing
44 components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and
46 nighttime-sky heat loss.

48 Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

QUALITY ASSURANCE

50 INSTALLER QUALIFICATIONS: An experienced installer who has completed glazing similar in material, design,
52 and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-
54 service performance.

56 SOURCE LIMITATIONS FOR GLASS: Obtain clear float glass from one primary-glass manufacturer.

58 SAFETY GLASS: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
60 Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing
62 Certification Council or another certification agency acceptable to authorities having jurisdiction.

64 GLAZING PUBLICATIONS: Comply with published recommendations of glass product manufacturers and
66 organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms
68 not otherwise defined in this Section or in referenced standards.

68 GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."

70 AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped
72 Glazing Guidelines."

74 SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines," and SIGMA TB-3001, "Sloped
76 Glazing Guidelines."

DELIVERY, STORAGE, AND HANDLING

78 PROTECT GLAZING MATERIALS according to manufacturer's written instructions and as needed to prevent
80 damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other
82 causes.

PROJECT CONDITIONS

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.

DO NOT INSTALL LIQUID GLAZING SEALANTS when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F (4.4 deg C).

SPECIFIED PRODUCT WARRANTY:

WARRANTY ON HERMETIC SEALS: Provide insulating glass manufacturer's written warranty, agreeing to, within specified warranty period, furnish FOB project site, replacement units for insulating glass units which have defective hermetic seals (excluding that due to glass breakage); defined to include intrusion of moisture or dirt, internal condensation at temperatures above -20 degrees F, deterioration of internal glass coating, and other visual evidence of seal failure or performance failure, provide manufacturer's instructions for handling, installation, protection and maintenance have been adhered to during warranty period.

WARRANTY PERIOD is ten (10) years after seal date permanently imprinted on unit, but not less than nine (9) years after date of substantial completion.

PART 2 - PRODUCTS

TYPICAL LOW-E CLEAR FLOAT GLASS: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select) in clear (not tinted) color, with a pyrolitic low-E coating on the # 2 surface, providing a minimum 0.70 Solar Heat Gain Coefficient:

“Comfort E2” by AFG Glass Co. or equal

TYPICAL LOW-E TINTED FLOAT GLASS: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select) tinted, with a pyrolitic low-E coating on the # 2 surface:

TYPICAL COLOR: “DARK-GREEN” glass as manufactured by either AFG or Visteon

PROCESSED GLASS:

TEMPERED GLASS: Provide prime glass of color and type indicated, which has been heat treated by vertical (tong-held) or horizontal (roller hearth) process, at manufacturer's option, except provide horizontal process where indicated as "tongless" or "free of tong marks". to strengthen glass in bending to not less than 4.5 times annealed strength.

TYPICAL LOW-E HURRICANE-RESISTANT GLASS: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select) in a laminated assembly per ASTM C 1172 requirements, in thickness required by wind-loads indicated, with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.

Interlayer Material: .090 Polyvinyl butyral sheets.

Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets. Laminate lites with polyvinyl butyral interlayer in autoclave with heat plus pressure.

Product/Manufacturer: “Comfort Ti-AC” by AFG Glass Co. or equal

TEMPERED GLASS: Provide prime glass of color and type indicated, which has been heat treated by vertical (tong-held) or horizontal (roller hearth) process, at manufacturer's option, except provide horizontal process where indicated as "tongless" or "free of tong marks". to strengthen glass in bending to not less than 4.5 times annealed strength.

LAMINATED GLASS: Comply with ASTM C 1172 for kinds of laminated glass indicated and other requirements specified, with interlayer material as indicated below, clear or in colors, and of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.

Interlayer Material: Polyvinyl butyral sheets.

Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets. Laminate lites with polyvinyl butyral interlayer in autoclave with heat plus pressure.

SPANDREL GLASS: Provide prime glass of color and type indicated, which has been processed to fuse a permanent ceramic coating on one face. Color to match adjacent glass as selected by Architect from manufacturer's standard colors. Laminate 2" thick, 6 lb. density, glass fiber insulation board (k-value of 0.26 max.) on inside face of spandrel panel, with backing of reinforced aluminum foil, formed at edges to profile indicated.

OBSCURE FILM: 2 mil thick pressure sensitive vinyl (PSV) for sandblasted, obscure appearance, equal to “Fasara” Interior Design Film as manufactured by 3M.

MIRROR GLASS & ACCESSORIES: 1/4" Quality q2 clear float glass with full silvered, copper and organic coating. Secure to wall substrate with "Palmer's" Mirror-Mastic or equal to wall backing, and provide polished-finish aluminum "J" channel equal to CRL # D638P "FHA Type J-Channel" support at base of mirror typically.

FABRICATED GLASS UNITS:

EDGE CONSTRUCTION: Twin primary seals of polyisobutylene; tubular aluminum or galvanized steel spacer-bar frame with welded or soldered sealed corners, and filled with desiccant; and secondary seal outside of bar, bonded to both sheets of glass and bar, of polysulfide, silicone or hot-melt butyl elastomeric sealant (fabricator's option).

INSULATING GLASS: Provide two (2) sheets of glass and 1/2" dry air or gas-filled space with -20 degrees F dew point, with Class A sealant-type edge construction to maintain a hermetic seal, utilizing one layer of clear glass and one layer of clear, low-E glass with a pyrolytic low-E coating on the # 3 surface, providing a minimum of 0.35 U-factor (winter night-time - R-value: 2.86), 0.79 Shading Coefficient, and 38% UV Transmission (summer-daytime); Dual Glazed "Comfort E2" by AFG Glass Co. or equal

TYPICAL TINTED INSULATING GLASS: Provide two (2) sheets of glass and 1/2" dry air of an argon-filled space with Class A sealant-type edge construction to maintain a hermetic seal, utilizing an out-board layer of tinted glass (tempered or heat-strengthened per glass design requirements) and an inboard layer of clear, low-E glass with a pyrolytic low-E coating on the # 3 surface;
"Insulite" ISL-107-89 2000 with a minimum 0.28 U-factor, 0.41 Shading Coefficient, and .36 solar heat gain coefficient, or equal

EXTERIOR SPANDREL GLASS PANELS: Provide full-insulated glass-panel assemblies matching typical color and type of transparent glass units, with an obscure film applied on the # 4 surface. Laminate 2" thick, 6 lb. density, glass fiber insulation board (k-value of 0.26 max.) on inside face of spandrels, with backing of reinforced aluminum foil.

OBSCURE FILM: "3M" "Fasara"– San Marino SH2MA MM (fully obscure) or approved equal

LAMINATED CERAMIC FRITTED GLASS: Double layers of 12 mm thick (minimum) panes (1 inch overall nominal) of heat-strengthened glass processed to fuse a permanent ceramic enamel frit coating on one face of each pane, with both panes thermally laminated (at the ceramic frit coating surfaces) in an autoclave with heat plus pressure complying with ASTM C 1172, to produce glass panels free of foreign substances and air or glass pockets:

Interlayer Material: Polyvinyl butyral sheets - .090 inch thick minimum, with a proven record of no tendency to bubble, discolor, or lose physical or mechanical properties after laminating glass lites and installation..

Glass Color: match typical glass above

Ceramic Enamel frit coating: double coating of "white" or blue-green tinted color on each glass pane (submit sample for approval prior to fabrication)

INTERIOR OBSCURE GLASS (At glazed doors and decorative removable light panels in casework): Laminated safety-glass with "3M" "Fasara"– Sagano SH2PT SA or approved equal obscure interlayer between 2 panes of 3 mm minimum "tinted" glass (not low-e at interior application) for overall fabricated thickness of approximately 6 mm (1/4 inch). Sand, grind or otherwise "smooth" all edges of decorative removable light-panels typically.

GLAZING SEALANTS AND COMPONENTS:

GLAZING TAPE AT HOLLOW-METAL FRAMING: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; 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; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

Expanded Cellular Glazing Tape: Closed-cell, PVC foam tape; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 - Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

MISCELLANEOUS GLAZING MATERIALS

Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

Setting blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.

Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

Edge blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

FABRICATE GLASS AND OTHER GLAZING PRODUCTS in sizes required to glaze 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 standard, to comply with system performance requirements.

INSTALLATION OF OBSCURE FILM: Shop apply film to glass surface before glazing.

PART 3 - EXECUTION

EXAMINATION: Examine framing glazing, with Installer present, for compliance with the following:
Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
Presence and functioning of weep system.
Minimum required face or edge clearances.
Effective sealing between joints of glass-framing members.

PROCEED WITH INSTALLATION only after unsatisfactory conditions have been corrected.

PREPARATION: Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

GLAZING, GENERAL

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.

PROTECT GLASS EDGES FROM DAMAGE during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

APPLY PRIMERS TO JOINT SURFACES where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.

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. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

PROVIDE SPACERS FOR GLASS LITES where the length plus width is larger than 50 inches as follows:

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.

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.

PROVIDE EDGE BLOCKING where 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.

SET GLASS LITES in each series with uniform pattern, draw, bow, and similar characteristics. 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.

SET OBSCURE FILM on inside of window units, where indicated.

TAPE GLAZING AT HOLLOW-METAL WORK:

POSITION TAPES ON FIXED STOPS so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

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. Do not remove release paper from tape until just before each glazing unit is installed. Apply heel bead of elastomeric sealant.

2 **CENTER GLASS LITES IN OPENINGS ON SETTING BLOCKS** and press firmly against tape by inserting dense
4 compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket
6 applications at corners and work toward centers of openings.

6 **PROTECTION AND CLEANING**

8 **PROTECT EXTERIOR GLASS FROM DAMAGE** immediately after installation by attaching crossed streamers to
10 framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean
12 surfaces.

12 **PROTECT GLASS FROM CONTACT WITH CONTAMINATING SUBSTANCES** resulting from construction
14 operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with
16 glass, remove them immediately as recommended by glass manufacturer.

16 **EXAMINE GLASS SURFACES** adjacent to or below exterior concrete and other masonry surfaces at frequent
18 intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains;
20 remove as recommended by glass manufacturer.

20 **REMOVE AND REPLACE GLASS THAT IS BROKEN**, chipped, cracked, abraded, or damaged in any way,
22 including natural causes, accidents, and vandalism, during construction period.

22 **WASH GLASS ON BOTH EXPOSED SURFACES** in each area of Project not more than four days before date
24 scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass
26 manufacturer.

END OF SECTION 08 80 00

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide Gypsum Board Assemblies where indicated on the Drawings, as specified herein, and
as necessary for complete installation. Types of applications include but are not limited to the following:
8 Non-load-bearing steel framing.
Interior gypsum wallboard.

10 RELATED SECTIONS include the following:

12 Division-05 Section "Cold-Formed Metal Framing" for load-bearing steel framing.

14 Division-06 Section "Rough Carpentry" for blocking installed within gypsum board assemblies.

16 Division-07 Section "Building Insulation" for insulation and vapor retarders installed in gypsum board
assemblies.

DEFINITIONS

18 GYPSUM BOARD TERMINOLOGY: Refer to ASTM C 1396 for definitions of terms for gypsum board
20 assemblies not defined in this Section or in other referenced standards.

SUBMITTALS

22 SUBMIT PRODUCT DATA: For each type of product indicated.

INFORMATIONAL SUBMITTALS

24 Evaluation Reports: Submit evaluation reports certified under an independent third-party inspection
26 program administered by an agency accredited by IAS to ICC-ES AC98 accreditation criteria for inspection
agencies, from ICC-ES, or other qualified testing agency acceptable to authorities having jurisdiction.

QUALITY ASSURANCE

28 CODE-COMPLIANCE CERTIFICATION OF STUDS AND TRACKS: Provide documentation that framing
30 members are certified in accordance with the product-certification program of the Steel Framing Industry
Association (SFIA) or a similar organization that provides a verifiable code compliance program.

32 FIRE-TEST-RESPONSE CHARACTERISTICS: For gypsum board assemblies with fire-resistance ratings, provide
34 materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an
independent testing and inspecting agency acceptable to authorities having jurisdiction.

36 FIRE-RESISTANCE-RATED ASSEMBLIES: Indicated by design designations from UL's "Fire Resistance
38 Directory."

DELIVERY, STORAGE, AND HANDLING

40 DELIVER MATERIALS in original packages, containers, or bundles bearing brand name and identification of
42 manufacturer or supplier. Protect cold-formed metal framing from deformation and other damage during delivery,
storage, and handling as required by AISI S202 "Code of Standard Practice."

44 STORE MATERIALS inside under cover and keep them dry and protected against damage from weather, direct
46 sunlight, surface contamination, corrosion, construction traffic, and other causes. Stack gypsum panels flat to
prevent sagging.

PROJECT CONDITIONS

50 ENVIRONMENTAL LIMITATIONS: Comply with ASTM C 840 requirements or gypsum board manufacturer's
52 written recommendations, whichever are more stringent.

PART 2 - PRODUCTS**PERFORMANCE REQUIREMENTS**

56 Design framing systems in accordance with AISI S220, unless otherwise indicated.

AVAILABLE MANUFACTURERS: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

STEEL FRAMING & FURRING:

ClarkDietrich.

MarinoWare; Division of Ware Ind.

Scafco Corporation.

GYPSUM BOARD AND RELATED PRODUCTS:

American Gypsum Co.

G-P Gypsum Corp.

National Gypsum Company.

United States Gypsum Co.

STEEL PARTITION FRAMING & FURRING COMPONENTS:

Comply with AISI S220 and ASTM C 754 for conditions indicated, and as follows:

Steel Sheet Components: Complying with AISI S220 and ASTM A653 requirements for steel and with manufacturer's standard corrosion-resistant zinc G40 (Z120) coating; or coating with equivalent corrosion resistance. Galvanized products are unacceptable.

Coating to demonstrate equivalent corrosion resistance with an evaluation report acceptable to authorities having jurisdiction.

Steel Studs: AISI S220, with minimum base steel thickness of 0.0150 inch or 0.0181 inch base steel thickness (20 gage equivalent) for flat-sheet steel, 3-5/8" depth minimum unless otherwise noted otherwise on the Drawings.

HAT-SHAPED FURRING CHANNELS: 7/8 inch minimum deep AISI S220 rigid units of 0.0296 inch (20 gage) minimum of commercial steel sheet with manufacturer's standard corrosion-resistant zinc coating. Provide stud manufacturer's standard clips, shoes, ties, reinforcements, fasteners and other accessories as needed for a complete stud system.

SUSPENDED SOFFIT/CEILING FRAMING:

Comply with AISI S220 and ASTM C 754 for conditions indicated, using steel members noted above, and as follows:

Tie Wire: ASTM A 641/A, Class 1 zinc coating, soft temper, 0.0625-inch- diameter (# 16 ASWG) wire minimum, or double strand of 0.0475-inch- diameter (# 18 ASWG) wire minimum.

Cold Rolled Channels: 0.0538-inch base steel thickness (16 gage), with minimum 1/2-inch- wide flange, 1-1/2 inch deep minimum unless otherwise noted.

Suspension or Hanger Wire: ASTM A 641/A soft-tempered carbon steel wire with Class 1 galvanized zinc coating, pre-stretched, with yield-stress load of at least four (4) times load of suspended materials, but not less than 0.106-inch diameter (#12 ASWG) wire minimum (for up to 85 lbs material load) or 0.1620 inch-diameter (# 8 ASWG) minimum for up to 210 lbs material load).

Expansion Anchor Hanger Anchors to Concrete: Post-installed expansion-anchor type units fabricated from corrosion-resistant materials with holes or loops for attaching hanger wires and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by a qualified independent testing agency; based on ICC-ES [AC01] [AC193] [AC58] [or] [AC308] as appropriate for the substrate.

Powder-Actuated Hanger Anchors to Concrete: Suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction, as determined by testing; with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

TOP-OF-WALL DEFLECTION TRACK:

PROVIDE SLOTTED DEFLECTION TRACK at all interior partitions to prevent compression of stud framing or cracking of gypsum board resulting from deflection of the structure above. Provide AISI S220 steel-sheet top-runner units of base steel thickness matching stud thickness (except as noted) with minimum 2-inch deep flange legs or other equivalent system.

BASE STEEL THICKNESS WITH 1-1/2" OR GREATER DEFLECTION: Provide deflection track units in next thicker available steel thickness than steel thickness indicated for the partition's stud framing.

Product: ClarkDietrich; [MaxTrak](#) Slotted Deflection Track or comparable product.

TYPICAL SINGLE LONG-LEG DEFLECTION TRACK (without gypsum board extending up to the deck above): 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 and spacer bar located within 12 inches of the top of studs to provide lateral bracing. Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

ClarkDietrich; [Deep Leg Deflection Track](#) and [Spazzer 9200 Bridging and Spacer Bar](#).

The Steel Network, Inc.; VertiTrack VTD Series.

DEFLECTION AND FIRESTOP TRACK WITH GYPSUM BOARD EXTENDING UP TO DECK and at fire-rated top-of-wall assemblies: Units manufactured to maintain continuity of fire-resistance-rated assemblies without crushing gypsum board. Products that may be incorporated into the Work include, but are not limited to, the following:

ClarkDietrich; [[BlazeFrame DL](#)] [[BlazeFrame DSL](#)] [[BlazeFrame RipTRAK](#)] [[UltraBEAD with UltraTRAK Slotted System](#)] [[UltraBEAD with Deep Leg Deflection Track](#)]
The Steel Network, Inc.; VertiTrack VTD Series.
Fire Trak Corp.; Fire Trak, attached to studs with Fire Trak Slip Clips typically.
Metal-Lite, Inc.; The System.

GYPSUM-BOARD MATERIALS:

INTERIOR GYPSUM WALLBOARD

Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and correspond with support system indicated.

Gypsum Wallboard: ASTM C 1396

Fire-resistive Type X (typical throughout project):

Thickness: 5/8 inch minimum, or as otherwise indicated.

Long Edges: Tapered.

Location: Where required for fire-resistance-rated assembly.

WATER-RESISTANT GLASS-MAT GYPSUM BACKING BOARD (behind all wall tile and tile base): 5/8" thick "DenShield" Fireguard by Georgia-Pacific in 4 foot wide panels by maximum length possible, complying with ASTM C 1178 and mold-resistant per ASTM D 3273, with glass mats both sides and long edges, with water-resistant treated core. Provide Type S-12, bugle head, self-tapping, rust-resistant, fine thread panel anchors.

INTERIOR TRIM ACCESSORIES: ASTM C 1047, galvanized or aluminum-coated steel sheet, rolled zinc, plastic, [vinyl, PVC-based composite,] or paper-faced galvanized steel sheet, in following shapes:

Cornerbead: Use at outside corners.

Product: ClarkDietrich; [[103 Deluxe Corner Bead](#)] [[Strait-Flex Original](#)] [[Vinyl Corner Bead](#)], or comparable product.

LC-Bead: J-shaped; exposed long flange receives joint compound; use at exposed panel edges.

Product: ClarkDietrich; [[Metal U-Trim M20A](#)] or comparable product.

Expansion (Control) Joint: Provide 2 - standard L-type edge trim beads, in lieu of manufacturer's standard one-piece control joint beads at locations indicated within Part 3 of this Specification, and where indicated on the Drawings.

Product: ClarkDietrich; [[Metal L-Trim M20B](#)] [[Vinyl L-Bead](#)] [[Strait-Flex L-Bead](#)] or comparable product.

JOINT TREATMENT MATERIALS: Comply with ASTM C 475, and as follows:

Joint Tape:

Interior Gypsum Wallboard: Paper.

Product: ClarkDietrich; [[Strait-Flex Butt-Tape](#)], or comparable product.

Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

Prefilling: At open joints and damaged surface areas, use setting-type taping compound.

Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.

Fill Coat: For second coat, use drying-type, all-purpose compound.

Finish Coat: For third coat, use drying-type, all-purpose compound.

Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.

JOINT TREATMENT AT GLASS-MAT GYPSUM BACKING BOARD: "Dow Corning" 795, "Pecora" 895, "GE" Silicone Silpruf Sealant, or "Tremco" Dymonic joint sealer with 2" wide 10 x 10 glass mesh quick tape or equivalent, and finish with "G-P" Gypsum setting-type joint compound

AUXILIARY MATERIALS

Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.

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.

PART 3 - EXECUTION

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. Proceed with installation only after unsatisfactory conditions have been corrected.

SUSPENDED CEILINGS: Comply with ASTM C754.

Coordinate installation of ceiling suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers at spacing required to support ceilings and that hangers will develop their full strength.

Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

INSTALLING STEEL FRAMING, GENERAL

Installation Standards: ASTM C 754, and ASTM C 840 requirements that apply to framing installation.

Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with gypsum board manufacturer's written recommendations or, if none available, with United States Gypsum's "Gypsum Construction Handbook."

Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement. Install slip-type joints at head of assemblies, and use deep-leg deflection track or proprietary deflection track at top of all partitions.

Isolate ceiling assemblies where they abut or are penetrated by building structure.

Isolate partition framing and wall furring where it abuts structure, except at floor.

Do not bridge building control and expansion joints with steel framing or furring members. Frame both sides of joints independently.

INSTALLING STEEL PARTITION AND SOFFIT FRAMING

Install tracks (runners) at floors, ceilings, and structural walls and columns where gypsum board assemblies abut other construction. Where studs are installed directly against exterior walls, install asphalt-felt isolation strip between studs and wall.

Installation Tolerance: Install each steel framing and furring member so fastening surfaces vary not more than 1/8 inch from the plane formed by the faces of adjacent framing.

Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

Cut studs 1/2 inch short of full height to provide perimeter relief.

For fire-resistance-rated partitions that extend to the underside of floor/roof slabs and decks or other continuous solid-structure surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed to support gypsum board closures and to make partitions continuous from floor to underside of solid structure. Terminate partition framing at suspended ceilings where indicated.

Spacing: Install steel studs and furring at 16 inches centers, unless otherwise indicated.

Install steel studs so flanges point in the same direction and leading edge or end of each panel can be attached to open (unsupported) edges of stud flanges first.

Frame door openings to comply with GA-600 and with gypsum board manufacturer's applicable written recommendations, unless otherwise indicated. Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

Install two studs at each jamb, typically.

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.

Extend jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

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.

Polyethylene Vapor Retarder: Install to comply with requirements specified in Division 7 Section "Building Insulation."

APPLYING AND FINISHING PANELS, GENERAL

Gypsum Board Application and Finishing Standards: ASTM C 840 and GA-216.

Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

Install gypsum 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.

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.

- Attach gypsum panels to steel studs so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- Attach gypsum panels to framing provided at openings and cutouts.
- Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members using deluxe resilient channels, or provide control joints to counteract wood shrinkage.
- Form control and expansion joints with space between edges of adjoining gypsum panels.
- Cover both faces of steel stud partition 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.
- Fit gypsum panels around ducts, pipes, and conduits.
- Where partitions intersect open concrete coffer, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffer, joists, and other structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- Floating Construction: Where feasible, including where recommended in writing by manufacturer, install gypsum panels over wood framing, with floating internal corner construction.
- STC-Rated Assemblies: Seal construction at perimeters, behind control and expansion 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 manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through gypsum board assemblies, including sealing partitions above acoustical ceilings.
- Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's written recommendations.
- MAXIMUM SCREW SPACING: 12 inches OC at all substrate framing members (at edges and in field) , typically, unless noted otherwise

PANEL APPLICATION METHODS

SINGLE-LAYER APPLICATION:

- On ceilings, apply gypsum panels before wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
- On partitions/walls, apply gypsum panels 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 board.

MULTILAYER APPLICATION 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.

- Single-Layer Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- Exterior Soffits and Ceilings: Apply exterior gypsum soffit board 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. Fasten with corrosion-resistant screws.

INSTALLING TRIM ACCESSORIES

- 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.
- Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- Install control joints above one sides of all door frames, and as otherwise required not to exceed a 30'-0" maximum uninterrupted surface.

FINISHING GYPSUM BOARD ASSEMBLIES

- 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.
- Prefill open joints and damaged surface areas.
- Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.

Gypsum Board Finish Levels: Finish panels to levels indicated below, according to ASTM C 840, for locations indicated:

Level 1: Embed tape at joints in ceiling plenum areas, concealed areas, and where indicated.

Level 4: Embed tape and apply separate first, fill, and finish coats of joint compound to tape, fasteners, and trim flanges at panel surfaces that will be exposed to view, unless otherwise indicated.

Level 5 Finish at gypsum-board ceilings in dining and “public” areas (not required in toilets): Embed tape in joint compound and apply first, fill (second), and finish (third) coats of joint compound over joints, angles, fastener heads, and accessories; and apply a thin, uniform skim coat of joint compound over entire surface. For skim coat, use joint compound specified for third coat, or a product specially formulated for this purpose and acceptable to gypsum board manufacturer. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects, tool marks, and ridges and ready for decoration.

Finish water-resistant, glass-mat gypsum backing board to comply with gypsum board manufacturer's directions

FIELD QUALITY CONTROL

ABOVE-CEILING OBSERVATION: Before installation of gypsum board ceilings, conduct an above-ceiling observation and report deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected. Before observation is done, complete the following in areas to receive gypsum board ceilings:

- Installation of 80 percent of lighting fixtures, powered for operation.
- Installation, insulation, and leak and pressure testing of water piping systems.
- Installation of air-duct systems.
- Installation of air devices.
- Installation of mechanical system control-air tubing.
- Installation of ceiling support framing.

INTERIOR STUD GAUGE/LIMITING HEIGHT SCHEDULE

TABLE BELOW is based on ProSTUD 20/18mil w/ 30mil 2’1-2” LegMaxTRAK, requirement for 5 PSF lateral pressure and 1/240 allowable deflection for flexible finishes, with 1 layer of gypsum board per side of stud.

ADJUST GAGE AND MAXIMUM HEIGHT for other acceptable manufacturers to conform to manufacturer's current printed specifications.

2-1/2”			
250PDS125-18	12"	14' 8"	
250PDS125-18	16"	14' 0"	
250PDS125-18	24"	12' 10"	
3-5/8”			
362PDS125-18	12"	17' 8"	
362PDS125-18	16"	16' 8"	
362PDS125-18	24"	15' 0"	
4”			
400PDS125-18	12"	18' 8"	
400PDS125-18	16"	17' 7"	
400PDS125-18	24"	15' 10"	
6”			
600PDS125-18	12"	25' 1"	
600PDS125-18	16"	23' 4"	
600PDS125-18	24"	20' 11"	

END OF SECTION 09 21 16

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide linear metal soffit where indicated on the Drawings, as specified herein, and as
8 necessary for a complete installation. This Section includes strip-type linear metal pans with filler strips and an
exterior suspension system.

10 PERFORMANCE REQUIREMENTS

12 STRUCTURAL PERFORMANCE: Provide exterior linear metal soffit capable of withstanding exterior exposure
14 and the effects of gravity loads and the following loads and stresses without showing permanent deformation of
16 soffit system components including pans and suspension system; noise or metal fatigue caused by vibration,
deflection, and displacement of soffit units; or permanent damage to fasteners and anchors.

18 Wind Load: Uniform pressure of 30 lbf/sq. ft. acting inward or outward.

20 THERMAL MOVEMENTS: Provide exterior linear metal soffit that allow for thermal movements resulting from
22 the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of
joints, overstressing of components, failure of connections, and other detrimental effects. Base engineering
calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

24 Temperature Change (Range): 100 deg F .

26 SEISMIC PERFORMANCE: Provide linear metal soffit designed and installed to withstand the effects of
earthquake motions according to the following:

28 CISCA's Recommendations for Acoustical Ceilings: Comply with CISCA's "Recommendations for Direct-
Hung Acoustical Tile and Lay-in Panel Ceilings--Seismic Zones 0-2."

30 UBC Standard 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-in Panel Ceilings."

32 SUBMITTALS

34 SUBMIT PRODUCT DATA for each type of product indicated, indicating compliance with performance values
indicated above.

36 INITIAL COLOR SELECTION: Set of 12-inch- long samples of each type and color required

38 MAINTENANCE DATA: For finishes to include in maintenance manuals.

42 QUALITY ASSURANCE

44 SOURCE LIMITATIONS: Obtain each set of linear metal pans and suspension systems from one source with
46 resources to provide products of consistent quality in appearance, physical properties, and performance.

48 DELIVERY, STORAGE, AND HANDLING

50 DELIVER LINEAR METAL pans, suspension system components, and accessories to Project site in original,
52 unopened packages 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.

54 COORDINATION

56 Coordinate layout and installation of linear metal pans and suspension system with other construction that penetrates
58 soffit or is supported by them, including but not necessarily limited to light fixtures, and the fire-suppression system.

60 **PART 2 - PRODUCTS**

62 AVAILABLE MANUFACTURERS: Subject to compliance with requirements, manufacturers that produce
64 products that may be incorporated into the Work include, but are not limited to, the following:

66 American Decorative Ceilings
ATAS International, Inc.
Ceilings Plus

Chicago Metallic Corp.
Simplex Ceilings

LINEAR METAL CEILING

METAL PAN STANDARD: Provide manufacturer's standard linear metal pans of configuration indicated that comply with ASTM E 1264 classifications as designated by types, acoustical ratings, and light reflectances, unless otherwise indicated.

SHEET METAL CHARACTERISTICS:

ALUMINUM SHEET: Roll-formed aluminum sheet, complying with ASTM B 209; alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated. For fabrications 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, roughness, stains, or discolorations.

LINEAR METAL CEILING PANS: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated to snap on and be securely retained on carriers without separate fasteners. Fabricate pan splices of same material as pans, in minimum 8" lengths, with same finish as pans.

Pan Thickness: Not less than 0.024 inch
Pan Edge Detail: Square.
Linear Module Width and Pan Face Width: 4-inch nominal width with 3-1/4-inch minimum face width
Pan Depth: 5/8 inch deep minimum

Pan Face Finish: Manufacturer's standard baked enamel paint finish in color selected from manufacturer's full range
Exposed End Caps: Manufacturer's standard material, fabricated to fit and conceal exposed ends of pans, in finish to match pan
Filler Strips: Metal matching pans fabricated to uninterrupted close voids between pans:
Recessed design profile, finish to match pan

EDGE MOLDINGS AND TRIM: Provide manufacturer's standard moldings and edge trim for exposed members, for edges and penetrations, to conceal ends of pans and carriers, for fixture trim and adapters, for fasciae at changes in ceiling height, and for other conditions; of metal and finish matching linear metal pans, unless otherwise indicated. For circular penetrations, fabricate edge moldings to diameter required to fit penetration exactly.

METAL SUSPENSION SYSTEMS

METAL SUSPENSION SYSTEMS STANDARD: Provide ceiling manufacturer's standard metal suspension systems of types and finishes indicated that comply with applicable ASTM C 635 requirements. Provide system complete with carriers, splice sections, connector clips, alignment clips, leveling clips, hangers, retention clips, load-resisting struts, fixture adapters, and other components required to support soffit and other soffit-supported construction.

SIZE ATTACHMENT DEVICES for 5 times the design load indicated in ASTM C 635, Table 1, Direct Hung, unless otherwise indicated.

WIRE HANGERS, BRACES, AND TIES: Provide wire complying with the following requirements:
Zinc-Coated Carbon-Steel Wire: ASTM A 641, Class 1 zinc coating, soft temper.
Size: Select wire diameter so its stress at 3 times the hanger design load (ASTM C 635, Table 1, Direct Hung) will be less than yield stress of wire, but provide not less than 0.135-inch- diameter wire.

EXTERIOR BRACING CHANNELS, COMPRESSION STRUTS AND ANGLES: Cold-rolled steel, hot-dip galvanized to comply with ASTM A 653 G60 coating designation; size and profile as required to withstand wind and seismic loads. Provide 5/16" minimum bolted connections for attachments to structural members.

MAIN CARRIERS: minimum 0.24 inch thick rolled aluminum sheet of alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, complying with ASTM B 209, with baked enamel finish. Provide carrier splices of same metal, profile, and finish as indicated for carriers.

STABILIZER CHANNELS, TEES, AND BARS: Manufacturer's standard components for stabilizing main carriers at regular intervals and at light fixtures, air-distribution equipment, access doors, and other equipment; spaced as standard with manufacturer for use indicated; and factory finished with matte-black baked finish.

HOLD-DOWN CLIPS: Manufacturer's standard hold-down clips spaced as standard with manufacturer.

FINISHES

2 COMPLY WITH NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations
3 for applying and designating finishes.

4 PROTECT MECHANICAL FINISHES on exposed surfaces from damage by applying a strippable, temporary
5 protective covering before shipping.

6 APPEARANCE OF FINISHED WORK: Variations in appearance of abutting or adjacent pieces are acceptable if
7 they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not
8 acceptable. Variations in appearance of other components are acceptable if they are within the range of approved
9 Samples and are assembled or installed to minimize contrast.

10 COLOR-COATED PAINTED FINISH: Manufacturer's standard baked-enamel paint finish complying with coating
11 manufacturer's written instructions for surface preparation, pretreatment, application, baking, and minimum dry film
12 thickness.

16 PART 3 - EXECUTION

17 EXAMINE SUBSTRATES, areas, and conditions, including structural framing and substrates to which linear metal
18 soffit attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that
19 affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions
20 affecting performance of linear metal soffit.

21 PROCEED WITH INSTALLATION only after unsatisfactory conditions have been corrected.

22 PREPARATION: Measure each ceiling area and establish layout of linear metal pans to balance border widths at
23 opposite edges of each ceiling. Avoid using less-than-half-width pans at borders, and comply with layout shown on
24 reflected ceiling plans.

25 INSTALL LINEAR METAL SOFFIT to comply with UBC Standard 25-2 and seismic requirement indicated, per
26 manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

27 SUSPEND HANGERS from building's structural members and as follows:

28 Install hangers plumb and free from contact with insulation or other objects within plenum that are not part
29 of supporting structure or of ceiling suspension system.

30 Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing,
31 countersplaying, or other equally effective means.

32 Where width of ducts and other construction within plenum produces hanger spacings that interfere with
33 location of hangers at spacings required to support standard suspension system members, install
34 supplemental suspension members and hangers in form of trapezes or equivalent devices. Size
35 supplemental suspension members and hangers to support ceiling loads within performance limits
36 established by referenced standards and publications.

37 Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by
38 attaching to inserts, eye screws, or other devices that are secure and appropriate for both structure
39 to which hangers are attached and type of hanger involved. Install hangers in a manner that will
40 not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.

41 Do not attach hangers to steel deck tabs or to steel roof deck. Attach hangers to structural members only.

42 Space hangers not more than 48 inches o.c. along each member supported directly from hangers, unless
43 otherwise indicated; and provide hangers not more than 8 inches from ends of each member.

44 INSTALL EDGE MOLDINGS AND TRIM of type indicated at perimeter of linear metal ceiling area and where
45 necessary to conceal edges and ends of linear metal pans. Screw attach moldings to substrate at intervals not more
46 than 16 inches o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of
47 1/8 inch in 12 feet. Miter corners accurately and connect securely.

48 **DO NOT USE EXPOSED FASTENERS, including pop rivets, on moldings and trim.**

49 INSTALL CARRIERS so they are aligned and securely interlocked with one another. Remove and replace dented,
50 bent, or kinked members.

51 CUT LINEAR METAL PANS for accurate fit at borders and at interruptions and penetrations by other work
52 through soffit. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness
53 exceeding referenced standards for stretcher-leveled metal sheet.

54 INSTALL LINEAR METAL PANS in coordination with suspension system and exposed moldings and trim. Align
55 joints in adjacent courses to form uniform, straight joints parallel to building lines in both directions, unless
56 otherwise indicated. Fit adjoining units to form flush, tight joints. Scribe and cut units for accurate fit at borders
57 and around construction penetrating ceiling.

2 INSTALL PANS WITH BUTT JOINTS using internal pan splices and in the following joint configuration:
4 Aligned, every other pan length.

6 INSTALL END CAPS where metal pan ends are visible, unless trim is indicated.

8 INSTALL FILLER STRIPS BETWEEN EACH PAN, or as otherwise indicated.

10 CLEANING

12 CLEAN EXPOSED SURFACES of linear metal soffit, including trim and edge moldings after removing strippable,
14 temporary protective covering (if any). Comply with manufacturer's written instructions for stripping of temporary
16 protective covering, cleaning, and touchup of minor finish damage. Remove and replace ceiling components that
cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and
bent units.

18 **END OF SECTION 09 54 23**

PART 1 - GENERAL

RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

THIS SECTION INCLUDES surface preparation and field painting of the following:

- Standard painted surfaces, interior and exterior.
- Exposed exterior items and surfaces not otherwise finished.
- Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- Where items or surfaces are not specifically mentioned, paint the same as similar adjacent materials or areas.

DO NOT PAINT the following:

- Finished metal surfaces, operating parts, and labels.
- Prefinished items include the following factory-finished components:
 - Finished mechanical and electrical equipment.
 - Light fixtures.
 - Distribution cabinets.

Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

- Foundation spaces.
- Furred areas.
- Ceiling plenums.
- Utility tunnels.
- Pipe spaces.
- Duct shafts.

FINISHED METAL SURFACES INCLUDE the following:

- Anodized aluminum.
- Stainless steel.
- Chromium plate.
- Copper.
- Bronze and brass.

OPERATING PARTS INCLUDE moving parts of operating equipment and the following:

- Valve and damper operators.
- Linkages.
- Sensing devices.
- Motor and fan shafts.

LABELS: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

RELATED SECTIONS include the following:

- Division 5 Section "Structural Steel" for shop priming structural steel.
- Division 5 Section "Metal Fabrications" for shop priming ferrous metal.
- Division 8 Section "Steel Doors and Frames" for shop priming steel doors and frames.
- Division 9 Section "Gypsum Board Assemblies" for surface preparation for gypsum board.
- Divisions 15 and 16: Painting of mechanical and electrical work is specified in Divisions 15 and 16, respectively.

DEFINITIONS

STANDARD COATING TERMS defined in ASTM D 16 apply to this Section.

- FLAT refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
- EGGSHELL refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
- SATIN refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.
- SEMIGLOSS refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.
- FULL GLOSS (GLOSS) refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

DFT (as used in Paint Schedule): Dry Film Thickness required for installed paint product.

SUBMITTALS

PRODUCT DATA: For each paint system specified. Include block fillers and primers.

MATERIAL LIST: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.

MANUFACTURER'S INFORMATION: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.

VOC CERTIFICATION: Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

SAMPLES FOR INITIAL SELECTION: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated. After color selection, the Architect will approve contractor provided color chips for surfaces to be coated.

SAMPLES FOR VERIFICATION: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.

Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved

Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.

Submit Samples on the following substrates for the Architect's review of color and texture only:

Ferrous Metal: Provide two 4-inch- square samples of flat metal and two 8-inch- long samples of solid metal for each color and finish.

LIST OF MOCKUP MATERIALS: List manufacturer's product/color names, finishes, and other information as required to identify materials used. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents, unless such deviations are specifically brought to the attention of the Architect and approved in writing.

QUALIFICATION DATA: For firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

QUALITY ASSURANCE:

APPLICATOR QUALIFICATIONS: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.

SOURCE LIMITATIONS: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

FINAL APPROVAL of colors will be from job-applied samples.

MOCKUP:

PROVIDE MATERIALS for construction of a field mockup of each different color and finish indicated.

BEFORE PAINTING, build mockup to verify selections made under sample Submittals and to demonstrate aesthetic effects. Refer to Division-I Section Quality Requirements for general requirements of Mockup.

DELIVERY, STORAGE, AND HANDLING

DELIVER MATERIALS to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

Product name or title of material.

Product description (generic classification or binder type).

Manufacturer's stock number and date of manufacture.

Contents by volume, for pigment and vehicle constituents.
Thinning instructions.
Application instructions.
Color name and number.
VOC content.

STORE MATERIALS not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

PROTECT FROM FREEZING. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

PROJECT CONDITIONS

APPLY WATER-BASED PAINTS only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F.

APPLY SOLVENT-THINNED PAINTS only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F.

DO NOT APPLY PAINT in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

EXTRA MATERIALS

FURNISH EXTRA PAINT MATERIALS from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the Owner.

QUANTITY: Furnish the Owner with an additional 5 percent, but not less than 1 gal. or 1 case, as appropriate, of each material and color applied.

PART 2 - PRODUCTS

MANUFACTURERS:

AVAILABLE PRODUCTS: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in the paint schedules.

MANUFACTURERS NAMES: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:

Benjamin Moore & Co. (BM)
PPG Paints (PPG)
Sherwin-Williams Co. (SW)

PAINT MATERIALS, GENERAL

MATERIAL COMPATIBILITY: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

MATERIAL QUALITY: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.

PROPRIETARY NAMES: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers. Furnish manufacturer's material data and certificates of performance for proposed substitutions.

COLORS: Provide color selections made by the Architect.

PART 3 - EXECUTION**EXAMINATION**

EXAMINE SUBSTRATES, AREAS, AND CONDITIONS, with the Applicator present, under which painting will be performed for compliance with paint application requirements.

DO NOT BEGIN TO APPLY PAINT until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

COORDINATION OF WORK: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

NOTIFY THE ARCHITECT about anticipated problems using the materials specified over substrates primed by others.

PREPARATION

GENERAL: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.

AFTER COMPLETING PAINTING OPERATIONS in each space or area, reinstall items removed using workers skilled in the trades involved.

CLEANING: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

SURFACE PREPARATION:

CLEAN AND PREPARE SURFACES to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

PROVIDE BARRIER COATS over incompatible primers or remove and reprime.

FERROUS METALS: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Association for Materials Protection and Performance (AMPP) recommendations. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of SSPC-SP6.

Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.

GALVANIZED SURFACES: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.

MATERIALS PREPARATION:

MIX AND PREPARE PAINT MATERIALS according to manufacturer's written instructions.

MAINTAIN CONTAINERS used in mixing and applying paint in a clean condition, free of foreign materials and residue.

STIR MATERIAL before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using. Use only thinners approved by paint manufacturer and only within recommended limits.

TINTING: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

APPLICATION

APPLY PAINT according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied. Paint colors, surface treatments, and finishes are indicated in the drawings.

DO NOT PAINT OVER dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.

PROVIDE FINISH COATS that are compatible with primers used.

THE TERM "EXPOSED SURFACES" INCLUDES areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.

PAINT SURFACES BEHIND MOVABLE EQUIPMENT and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.

PAINT INTERIOR SURFACES of ducts with a flat, nonspecular black paint where visible through registers or grilles.

PAINT BACK SIDES OF ACCESS PANELS and removable or hinged covers to match exposed surfaces.

FINISH EXTERIOR DOORS on tops, bottoms, and side edges the same as exterior faces.

FINISH INTERIOR OF WALL AND BASE CABINETS and similar field-finished casework to match exterior.

SAND LIGHTLY between each succeeding enamel or varnish coat.

PROVIDE PAINTING at all exterior exposed unsightly pipes, conduits panels, as specified by Owner or Architect.

SCHEDULING PAINTING: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

THE NUMBER OF COATS AND THE FILM THICKNESS required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.

OMIT PRIMER ON METAL SURFACES that have been shop primed and touchup painted.

IF UNDERCOATS, STAINS, OR OTHER CONDITIONS SHOW THROUGH final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

ALLOW SUFFICIENT TIME BETWEEN SUCCESSIVE COATS to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the undercoat to lift or lose adhesion.

APPLICATION PROCEDURES: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.

Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the material and texture required.

Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.

MINIMUM COATING THICKNESS: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.

MECHANICAL AND ELECTRICAL WORK: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces. Refer to Sections 15 and 16.

BLOCK FILLERS: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.

PRIME COATS: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others.

RECOAT PRIMED AND SEALED SURFACES where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.

PIGMENTED (OPAQUE) FINISHES: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

TRANSPARENT (CLEAR) FINISHES: Use multiple coats to produce a glass-smooth surface film of even luster. Lightly sand the surface between each successive coat. Provide a finish free of laps, runs, cloudiness, color irregularity, brush marks, orange peel, nail holes, or other surface imperfections. Typically, provide satin finish for final coats, unless noted otherwise.

COMPLETED WORK: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

FIELD QUALITY CONTROL

THE OWNER RESERVES THE RIGHT to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:

- Quantitative material analysis.
- Abrasion resistance.
- Apparent reflectivity.
- Flexibility.
- Washability.
- Absorption.
- Accelerated weathering.
- Dry opacity.
- Accelerated yellowness.
- Recoating.
- Skinning.
- Color retention.
- Alkali and mildew resistance.

THE OWNER MAY DIRECT THE CONTRACTOR to stop painting if test results show material being used does not comply with specified requirements. The Contractor shall remove noncomplying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the 2 coatings are incompatible.

CLEANING

CLEANUP: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.

AFTER COMPLETING PAINTING, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

PROTECTION

PROTECT WORK OF OTHER TRADES, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

PROVIDE "WET PAINT" SIGNS to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

AT COMPLETION OF CONSTRUCTION ACTIVITIES of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

EXTERIOR PAINT SCHEDULE

EXTERIOR PAINTED WOODWORK & TRIM: Provide the following finish system over solid-color (opaque) painted exterior woodwork (or simulated woodwork) and trim:

PRIMER: Provide factory-formulated wood primer for exterior application applied at spreading rate indicated as recommended by manufacturer:

BM: Moorcraft Super Spec Alkyd Exterior Primer No. 176 – 1.8 mils DFT
PPG: Seal-Grip 17-921XI Interior/Exterior Acrylic Latex Wood Primer – 1.6 mils DFT
SW: A-100 Exterior Latex Wood Primer B42W42 – 1.6 DFT

SATIN/EGGSHELL ENAMEL FINISH: Provide two (2) finish coats of factory-formulated low-sheen (eggshell) acrylic-latex paint for exterior application over primer at spreading rate indicated as recommended by manufacturer:

BM: Moorcraft Super Spec Low Lustre Latex House Paint No. 185: 1.0 mil DFT per coat
PPG: 6-2110XI Series SpeedHide Exterior House & Trim Satin--Acrylic Latex: 1.3 mil DFT per coat
SW: A-100 Exterior Latex Satin House & Trim Paint A82 Series – 1.5 mils DFT per coat

EXTERIOR PAINTED SOFFITS: Provide the following finish system to exterior soffits:

PRIMER: Factory-formulated alkyd- or alkali-resistant acrylic-latex primer for exterior application at spreading rate indicated as recommended by manufacturer.

BM: Moorcraft Super Spec Alkyd Exterior Primer No. 176 – 1.8 mils DFT
PPG: 4-603XI Perma-Crete Interior/Exterior Acrylic Latex Alkali Resistant Primer – 1.5 mils DFT
SW: A-100 Exterior Latex Wood Primer B42W41 – 1.4 mils DFT

FLAT ACRYLIC FINISH: Provide two (2) finish coats of factory-formulated, flat, exterior, acrylic-emulsion paint over primer applied at spreading rate indicated as recommended by manufacturer:

BM: Moorcraft Super Spec Flat Latex House Paint No. 171 – 1.2 mils DFT per coat
PPG: 6-610XI Series SpeedHide Exterior House Paint Flat Latex – 1.4 mils DFT per coat
SW: A-100 Exterior Latex Flat House & Trim Paint A6 Series – 1.3 mils DFT per coat

EXTERIOR CONCRETE MASONRY UNITS (including inside the trash enclosures): Provide the following finish systems over exterior concrete masonry units (unless indicated as “decorative CMU’s or :

BLOCK FILLER/PRIMER: High-performance, latex block filler applied at spreading rate indicated as recommended by manufacturer, and as otherwise required by surface characteristics and porosity of block:

BM: Moorcraft Super Craft Latex Block Filler No. 285: 8.1 mils DFT
PPG: 6-15XI SpeedHide Hi Fill Interior/Exterior Masonry Latex Block Filler: 8.0 mils DFT.
SW: PrepRite Interior/Exterior Block Filler B25W25: 8.0 mils DFT.

SATIN/EGGSHELL ENAMEL FINISH: Provide two (2) finish coats of factory-formulated low-sheen (eggshell) acrylic-latex paint for exterior application over primer at spreading rate indicated as recommended by manufacturer:

BM: Moorcraft Super Spec Low Lustre Latex House Paint No. 185: 1.0 mil DFT per coat
PPG: 6-2110XI Series SpeedHide Exterior House & Trim Satin--Acrylic Latex: 1.3 mil DFT per coat
SW: A-100 Exterior Latex Satin House & Trim Paint A82 Series – 1.5 mils DFT per coat

EXTERIOR FERROUS METAL: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items.

PRIMER: Rust-inhibitive metal primer applied at spreading rate indicated as recommended by manufacturer.

BM: Moore's IMC Alkyd Metal Primer No. M06 - 2.0 mils DFT
PPG: Multi-Prime Alkyd Metal Primer 4160 series – 2.5 mils DFT
SW: Kem Kromik Universal Metal Primer B50NZ6/B50WZ1 - 3.0 mils DFT

SEMI-GLOSS ACRYLIC ENAMEL FINISH: Provide two (2) finish coats of factory-formulated, exterior, semigloss waterborne acrylic-latex enamel paint applied over primer at spreading rate indicated as recommended by manufacturer:

BM: Moorcraft Super Spec Latex House & Trim Paint No. 170: 1.1 mil DFT per coat
PPG: 6-900XI Series SpeedHide Exterior House & Trim Semi-Gloss Acrylic Latex Paint: 1.4 mil DFT per coat
SW: A-100 Latex Gloss A8 Series: 1.3 mil DFT per coat

EXTERIOR ZINC-COATED METAL: Provide the following finish systems over exterior zinc-coated (galvanized) metal surfaces:

PRIMER: Galvanized metal primer applied at spreading rate indicated as recommended by manufacturer:

BM: Moore's IMC Acrylic Metal Primer No. M04 – 2.0 mils DFT

PPG: 90-712 Pitt-Tech Interior/Exterior Primer/Finish DTM Industrial Enamel – 3.0 DFT

SW: primer not required over this substrate

SEMI-GLOSS ACRYLIC ENAMEL FINISH: Provide two (2) finish coats of factory-formulated, exterior, semigloss waterborne acrylic-latex enamel paint applied over primer at spreading rate indicated as recommended by manufacturer:

BM: Moorcraft Super Spec Latex House & Trim Paint No. 170: 1.1 mil DFT per coat

PPG: 6-900XI Series SpeedHide Exterior House & Trim Semi-Gloss Acrylic Latex Paint: 1.4 mil DFT per coat

SW: A-100 Latex Gloss A8 Series: 1.3 mil DFT per coat

EXTERIOR WOOD TRIM: SEMI-TRANSPARENT OIL/ALKYD STAIN

FINISH: 2 Finish Coats:

BM: Arborcoat 328

PPG: FLD 802 Pro Series

SW:

EXTERIOR WOOD TRIM: EGGSHELL/SATIN ENAMEL:

Primer:

BM: Ultra Spec N558

PPG: Seal Grip Exterior Wood Primer 17-921XI series.

SW: Exterior Wood Primer B42W08041

Finish Coat:

BM: Ultra Spec N448

PPG: Speedhide Exterior Acrylic Satin 6-2110XI series

SW: A100 Satin A82W00151

EXTERIOR WOOD TRIM: SEMI-GLOSS LATEX FINISH

Primer:

BM: Ultra Spec N558

PPG: Seal Grip Exterior Wood Primer 17-921XI series.

SW: Exterior Wood Primer B42W08041

2 Finish Coats:

BM: Ultra Spec N449

PPG: Speedhide Exterior Acrylic Semi-Gloss 6-900XI series

SW: A100 A08W00251 Exterior Acrylic Semi-Gloss

EXTERIOR DRYWALL SOFFITS: FLAT ACRYLIC LATEX:

Primer:

BM: Ultra Spec N558

PPG: Seal Grip Exterior Primer 17-921XI series.

SW: Exterior Primer B42W08041

2 Finish Coats:

BM: Ultra Spec N447

PPG: Speedhide Exterior Acrylic Flat 6-610XI

SW: A100 Exterior Acrylic Flat A06W00151

EXTERIOR CMU WALLS: SATIN/EGGSHELL ENAMEL:

Block Filler:

BM: Ultra Spec 571

PPG: Speedhide Hi Fill 6-15XI

SW: Pro Industrial B42W00150

2 Finish Coats:

BM: Ultra Spec N448

PPG: Speedhide Exterior Acrylic Satin 6-2110XI

SW: A100 Exterior Acrylic Satin A82W00151

EXTERIOR CMU WALLS: SEMI-GLOSS ACRYLIC LATEX ENAMEL:

Block Filler:
BM: Ultra Spec 571
PPG: Speedhide Hi Fill 6-15XI
SW: Pro Industrial B42W00150
2 Finish Coats:
BM: Ultra Spec N449
PPG: Speedhide Exterior Acrylic Semi-Gloss 6-900XI series
SW: A100 A08W00251 Exterior Acrylic Semi-Gloss

EXTERIOR CMU WALLS: SEMI-GLOSS ACRYLIC ENAMEL:

Block Filler:
BM: Ultra Spec 571
PPG: Speedhide Hi Fill 6-15XI
SW: Pro Industrial B42W00150
2 Finish Coats:
BM: Ultra Spec HP Acrylic DTM Enamel Semi-Gloss
PPG: Pitt-Tech Plus EP Acrylic DTM Enamel, Semi-Gloss
SW: Pro Industrial Acrylic DTM Enamel, Semi-Gloss

EXTERIOR CMU WALLS: GLOSS ACRYLIC ENAMEL:

Block Filler & Primer:
BM: Ultra Spec 571
PPG: Speedhide Hi Fill 6-15XI
SW: Pro Industrial B42W00150
2 Finish Coats:
BM: Ultra Spec HP Acrylic DTM Enamel, Gloss
PPG: Pitt-Tech Plus EP Acrylic DTM Enamel, Gloss
SW: Pro Industrial Acrylic DTM Enamel, Gloss

EXTERIOR FERROUS METAL: SEMI-GLOSS ALKYD ENAMEL:

Primer:
BM: Super Spec P06
PPG: Multi-Prime 4160
SW: Kem Kromik B50WZ1
2 Finish Coats:
BM: Corotech Urethane Alkyd Enamel, Semi-Gloss
PPG: Industrial Alkyd Enamel Semi-Gloss, 7 series
SW: Pro Industrial Urethane Alkyd Enamel, Semi-Gloss

EXTERIOR FERROUS METAL: GLOSS ALKYD ENAMEL (typical metal trim):

Primer:
BM: Super Spec P06
PPG: Multi-Prime 4160
SW: Kem Kromik B50WZ1
2 Finish Coats:
BM: Corotech Urethane Alkyd Enamel, Semi-Gloss
PPG: Industrial Alkyd Enamel Semi-Gloss, 7 series
SW: Pro Industrial Urethane Alkyd Enamel, Semi-Gloss

EXTERIOR ZINC-COATED METAL: SEMI-GLOSS ALKYD ENAMEL:

Primer:
BM: Ultra Spec HP04
PPG: Pitt-Tech Plus 4020
SW: Pro Industrial B66W00011
2 Finish Coats:
BM: Corotech Urethane Alkyd Enamel, Semi-Gloss
PPG: Industrial Alkyd Enamel Semi-Gloss, 7 series
SW: Pro Industrial Urethane Alkyd Enamel, Semi-Gloss

EXTERIOR ZINC-COATED METAL: GLOSS ALKYD ENAMEL:

Primer:

BM: Ultra Spec HP04

PPG: Pitt-Tech Plus EP 90 Series

SW: Pro Industrial B66W00011

2 Finish Coats:

BM: Corotech Urethane Alkyd Enamel, Gloss

PPG: Industrial Alkyd Enamel, 7 Series, Gloss

SW: Pro Industrial Urethane Alkyd Enamel, Gloss

EXTERIOR FOUNTAIN-BASIN: 2-PART EPOXY POOL COATING

2 Finish Coats: "Insul-x" (800-225-5554) Epoxy Pool Coating # IG-3000 Series – 2 mil/coat min, or equal

INTERIOR PAINT SCHEDULE:**INTERIOR DRYWALL: EGGSHELL/SATIN LATEX ENAMEL (Class A: 5-5-0)**

Primer Coat: Interior Latex Primer Sealer

BM: Ultra Spec Zero VOC Interior Latex Primer N534 – 1.4 mils DFT

PPG: Speedhide Zero VOC Interior Latex Primer/Sealer – 1.4 mils DFT

SW: ProMar 200 Zero VOC Interior Latex Primer B28W02600 – 1.0 mil DFT

2 Finish Coats: Interior Latex "Eggshell-like" sheen

BM: Ultra Spec Zero VOC 538 – 1.7 mils DFT per coat

PPG: Speedhide Zero VOC Interior Latex Eggshell – 1.5 mil DFT per coat

SW: ProMar 200 Zero Eg-shell B20W12651 – 1.7 mils DFT per coat

Apply finish coats with roller, unless otherwise indicated

INTERIOR METAL: SEMI-GLOSS ALKYD ENAMEL (Class A: 5-5-0)

First Coat: Alkyd Anti-Corrosive Metal Primer

BM: Super Spec Alkyd Anti-Corrosive Metal Primer P06 – 1.9 mils DFT

PPG: Multi-Prime Alkyd Anti-Corrosive Metal Primer 4160 – 2.5 mils DFT

SW: Kem Kromik Alkyd Anti-Corrosive Metal Primer B50WZ1 – 3.5 mils DFT

Note: Primer not required to be applied in field on pre-primed items

2nd & 3rd. Coats: Interior Alkyd - Semi-Gloss

BM: Super Spec C271 Interior Alkyd Enamel Semi-Gloss – 1.7 mils DFT per coat

PPG: Glyptex Interior Alkyd Enamel Semi-Gloss 439 series – 2.0 mils DFT per coat

SW: ProMar 200 Interior Alkyd Enamel Semi-Gloss B34W00251 - 1.6 mils DFT per coat

Brush apply finish coats unless otherwise indicated

INTERIOR PAINTED WOOD: EGGSHELL ALKYD ENAMEL (Class A: 5-5-0)

Prime Coat: Interior Alkyd Primer Sealer

BM: Super Spec Alkyd Undercoater/Primer C245 – 1.5 mils DFT

PPG: SealGrip Premium Alkyd Wood Primer 17-9517 – 2.3 mils DFT

SW: Extreme Block Alkyd Wood Primer B49W00600 – 2.2 mils DFT

2nd & 3rd Coats: Interior Alkyd, Eggshell

BM: Water Borne Alkyd Satin 792 series – 1.3 mils DFT per coat

PPG: Glyptex Interior Alkyd Satin Enamel 39-10 series – 2.2 mils DFT per coat

SW: Pro Classice Alkyd Enamel Satin B33W00221 – 1.7 mils DFT per coat

Brush apply finish coats unless otherwise indicated

INTERIOR CMU WALLS: SEMI-GLOSS LATEX (Class A: 5-5-0)

Block Filler & Primer Coat: latex block filler

BM: Ultra Spec Latex Block Filler 571 – 8.5 DFT

PPG: Speedhide Hi Fill Latex Block Filler 6-15XI – 8.0 DFT

SW: Pro Industrial B42W00150 – 8.0 mils DFT

2 Finish Coats: Semi-Gloss Interior Latex

BM: Ultra Spec Zero VOC Interior Latex Semi-Gloss N539 – 1.8 mils DFT per coat

PPG: Speedhide Zero VOC Interior Latex Semi-Gloss – 1.3 mils DFT per coat

SW: ProMar 200 Zero VOC Interior Latex Semi-Gloss B31-2600 Series – 1.5 mils DFT per coat

INTERIOR METAL: SEMI-GLOSS ALKYD ENAMEL (Class A: 5-5-0)

Prime Coat: Alkyd Anti-Corrosive Metal Primer, Primer

BM: Super Spec Alkyd Anti-Corrosive Metal Primer P06 – 1.9 mils DFT

PPG: Multi-Prime Alkyd Anti-Corrosive Metal Primer 4160 – 2.5 mils DFT

SW: Kem Kromik Alkyd Anti-Corrosive Metal Primer B50WZ1 – 3.5 mils DFT

or

Galvanized Metal Primer (as appropriate)

BM: Ultra Spec HP Acrylic Metal Primer HP 04 – 2.0 mils DFT

PPG: Pitt-Tech Plus EP WB Acrylic Industrial Galvanized Metal Primer 90-712 series – 3.0 mils DFT

SW: Pro-Cryl Universal Primer B66W01310 – 2.8 mils DFT

Note: Primer not required to be applied in field on pre-primed items
2nd & 3rd Coats: Interior Alkyd Semi-Gloss
BM: Super Spec C271 Interior Alkyd Enamel Semi-Gloss – 1.7 mils DFT per coat
PPG: Glyptex Interior Alkyd Enamel Semi-Gloss 439 series – 2.0 mils DFT per coat
SW: ProMar 200 Interior Alkyd Enamel Semi-Gloss B34W00251 - 1.6 mils DFT per coat

INTERIOR EXPOSED STRUCTURE: DRY-FALL FLAT LATEX: (Class A, 5-5-0)

Note: Primer not required to be applied in field on pre-primed items
Verify compatibility of finish with existing primer(s) and adjust if necessary
2 Pass – Cross Coat Application: Dry Fall Latex Flat
BM: Superkote Acrylic Dryfall N110 – 2.5 mils DFT per pass
PPG: Speedhide Super-Tech Water Borne Acrylic Dryfall 6-725XI – 2.4 mils DFT per pass
SW: Pro Industrial WB Acrylic Dryfall B42W00181 – 1.9 mils DFT per pass

INTERIOR PAINTED WOOD: SEMI-GLOSS ALKYD ENAMEL (Class A: 5-5-0)

Prime Coat: Interior Alkyd Primer Sealer
BM: Super Spec Alkyd Undercoater/Primer C245 – 1.5 mils DFT
PPG: SealGrip Premium Alkyd Wood Primer 17-9517 – 2.3 mils DFT
SW: Extreme Block Alkyd Wood Primer B49W00600 – 2.2 mils DFT
2nd & 3rd Coats: Semi-Gloss Interior Alkyd
BM: Super Spec C271 Interior Alkyd Enamel Semi-Gloss – 1.7 mils DFT per coat
PPG: Glyptex Interior Alkyd Enamel Semi-Gloss 439 series – 2.0 mils DFT per coat
SW: ProMar 200 Interior Alkyd Enamel Semi-Gloss B34W00251 - 1.6 mils DFT per coat

Brush apply finish coats unless otherwise indicated

INTERIOR STAINED WOOD: ALKYD VARNISH SYSTEM

Tinted-paste filler coat: (omit on close-grained woods)BM:
Old Masters Paste Wood Filler
PPG: Old Masters Paste Wood Filler
SW: Sher-Wood Paste Wood Filler
Oil/Alkyd-based stain coat(s): color/intensity per sample
BM: Lenmar Interior Wood Stain
PPG: DEFT Interior Oil Based Wood Stain DFT400
SW: Wood Classics 250 Interior Oil Based Wood Stain
Alkyd-based clear wood sanding sealer: (lightly sanded)
BM:
PPG: DEFT Alkyd Based Fast Dry Sanding Sealer DFT60
SW: Wood Classics B26V43 FD Sanding Sealer
First Finish Coat: Alkyd Varnish - gloss (lightly sanded)BM:
PPG: DEFT Interior FD Oil Based Polyurethane DFT127 Gloss series
SW: Wood Classics Fast Dry Oil Varnish A66V00391
Second Finish Coat: Alkyd Varnish - satin (lightly sanded)BM:
PPG: DEFT Interior Oil Based Polyurethane DFT127 Satin series
SW: Wood Classics Fast Dry Oil Varnish A66F00390
Paste Wax (OPTIONAL)

INTERIOR STAINED WOOD: POLYURETHANE SYSTEM

Tinted-paste filler coat: (omit on close-grained woods)(omit on close-grained woods)
BM: Old Masters Paste Wood Filler
PPG: Old Masters Paste Wood Filler
SW: Sher-Wood Paste Wood Filler
Oil/Alkyd-based stain coat(s): color/intensity per sample color/intensity per sample
BM: Lenmar Interior Wood Stain
PPG: DEFT Interior Oil Based Wood Stain DFT400
SW: Wood Classics 250 Interior Oil Based Wood Stain
1st Finish Coat: Satin Polyurethane
BM: Lenmar Polyurethane Satin Wood Finish, 1Y 354
PPG: DEFT Interior Satin Polyurethane DFT 26
SW: Minwax Polyurethane Clear 71028
2nd Finish Coat: Gloss Polyurethane
BM: Lenmar Polyurethane Gloss Wood Finish
PPG: DEFT DFT 127 Interior Polyurethane Gloss Series
SW: Minwax Polyurethane Clear 71030
3rd Finish Coat: Satin Polyurethane
BM: Lenmar Polyurethane Satin Wood Finish, 1Y 354

PPG: DEFT Interior Satin Polyurethane DFT 26
SW: Minwax Polyurethane Clear 71028

END OF SECTION 09 91 00

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide exterior, pigmented, waterproof concrete coating as specified herein, and as necessary
8 for complete installation. Types of applications include the following:

Exterior exposed precast-concrete, including joists/slab units, beams and columns at exterior decks

10 SUBMIT PRODUCT DATA for each coating system and components specified.

12 INSTALLER QUALIFICATIONS: An installer with a minimum of 5 years demonstrable experience in installation
14 of coating systems by the manufacturer utilized. Installer's responsibilities include furnishing skilled technicians
specifically trained and experienced with application of the finishes required.

16 DELIVER MATERIALS to Project site in manufacturer's original, unopened packages and containers bearing
18 manufacturer's name and label, and with the following information: product name or title of material; manufacturer's
stock number and date of manufacture; contents by volume, for pigment and vehicle constituents; thinning
instructions (if permitted); application instructions; color name and number; handling instructions and precautions;
20 and VOC content.

22 STORE MATERIALS not in use in tightly covered containers in a well-ventilated area at a minimum ambient
24 temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
Protect coating materials from freezing. Keep storage area neat and orderly. Remove cleaning rags and waste daily.

26 APPLY COATINGS only when temperature of surfaces to be coated and surrounding air temperatures are between
28 40 and 90 deg F, unless otherwise permitted by manufacturer's written instructions. Do not apply coatings in snow,
rain, fog, or mist; when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew
30 point; or to damp or wet surfaces.

32 ALLOW WET SURFACES TO DRY THOROUGHLY and attain temperature and conditions specified before
starting or continuing coating operation.

PART 2 - PRODUCTS

34 BASIS OF DESIGN MANUFACTURER: This Section is based on use of products manufactured by:
36 Dayton Superior (www.daytonsuperiorchemical.com)

38 EXTERIOR CONCRETE COATING: "Seal Coat 1000", standard gray color, waterproof sealer or approved equal.

40 BONDING AGENT: Acrylic "Ad-Bond" (J-40) or approved equal.

42 COATING MATERIAL COMPATIBILITY: Provide primers and related materials that are compatible with one
44 another and with the substrates indicated under conditions of service and application, as demonstrated by
manufacturer based on testing and field experience.

PART 3 - EXECUTION

48 EXAMINE SUBSTRATES and conditions, with installer present, for compliance with requirements for coating
50 application. Proceed with coating application only after unsatisfactory conditions have been corrected and surfaces
are thoroughly dry. Start of coating application will be construed as Applicator's acceptance of surface conditions.

52 CLEAN SUBSTRATES of substances that could impair bond of coating systems before applying coatings or other
54 surface treatments. Remove oil and grease before cleaning. Schedule cleaning and coating application so dust and
other contaminants from cleaning process will not fall on wet, newly coated surfaces.

56 CLEAN AND PREPARE SURFACES to be coated according to manufacturer's written instructions for particular
58 substrate conditions and as specified. Provide barrier coats over incompatible primers or remove and reprime.
Remove efflorescence, chalk, dust, dirt, release agents, grease, oils, and similar impediments to good adhesion by
60 water blasting followed by a clear water rinse. Remove mildew and neutralize surfaces according to manufacturer's
written instructions before patching materials are applied. Roughen as required to remove glaze. Use abrasive blast-
62 cleaning methods if recommended by coating manufacturer.

IF HARDENERS OR SEALERS HAVE BEEN USED to improve concrete curing, use mechanical methods for surface preparation.

DETERMINE ALKALINITY AND MOISTURE CONTENT of surfaces to be coated by performing appropriate tests. If surfaces are sufficiently alkaline to cause finish paint to blister and burn, correct this condition before application. Do not apply coatings over surfaces where moisture content exceeds that permitted in manufacturer's written instructions.

FILL CRACKS according to manufacturer's written instructions before coating surfaces. Remove dust and dirt from around cracks. Remove mildew by sterilizing before filling. Apply crack filler primer recommended by manufacturer with a brush to obtain uniform coverage and spread approximately 2 inches on each side of cracks. Fill cracks with manufacturer's recommended crack filler applied with a putty knife or trowel, and allow for shrinkage. If excessive shrinkage occurs, reapply crack filler.

MIX AND PREPARE MATERIALS according to manufacturer's written instructions. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.

Mix one (1) part bonding agent to three (3) parts clean water

Use approximately 8 quarts of mix water blend above per 50 lb bag of dry sealer

STIR MATERIALS before application to produce a mixture of uniform density. Stir as required during application. If surface film forms, do not stir film into material. If necessary, remove film and strain coating material before using. If manufacturer permits thinning, use only thinners recommended by manufacturer, and only within recommended limits.

APPLICATION

APPLY COATINGS according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied. Do not coat over conditions detrimental to formation of a durable coating film, such as dirt, rust, scale, grease, moisture, and scuffed surfaces. Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared as soon as practicable after preparation and before subsequent surface deterioration. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.

ALLOW SUFFICIENT TIME BETWEEN SUCCESSIVE COATS to permit proper drying. Do not recoat surfaces until coating has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat does not cause undercoat to lift or lose adhesion.

APPLY MATERIALS by brush, roller, or spray according to manufacturer's written instructions. As applicable, use brushes best suited for the material being applied. Use professional-quality quick-release rollers of carpet, velvet back, or high-pile sheep's wool covers with a 1- to 1-1/4-inch nap as recommended by manufacturer for material and texture required. Use hopper-type spray equipment with orifice size recommended by manufacturer for material and texture required, and back brush into surface after spray application.

PRECAST CONCRETE COATING: Apply two (2) coats minimum at the following rate:

First Coat: 150 – 250 SF / 50 lb bag

Second coat: 200 – 400 SF / 50 lb bag

CLEANING

CLEANUP: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

AFTER COMPLETING COATING WORK, clean glass and spattered surfaces. Remove spattered coatings by washing, scraping, or other methods, being careful not to scratch or damage adjacent finished surfaces.

PROTECTION

PROTECT THE WORK OF OTHER TRADES from damage whether being coated or not. Correct damage by cleaning, repairing, replacing, and recoating operations. Leave finished coatings in an undamaged condition.

PROVIDE "Wet Paint" signs to protect newly coated finishes, when applicable. Remove temporary protective wrappings provided by others to protect their work after completing coating operations. After construction activities of other trades are complete, touch up and restore damaged or defaced coated surfaces.

END OF SECTION 09 97 23

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide exterior, textured concrete coatings where indicated on the Drawings, as specified
8 herein, and as necessary for complete installation. Types of applications include but are not limited to the following:
Spray-applied textured acrylic finish coating at drywall soffits

SUBMITTALS

10
12 SUBMIT PRODUCT DATA for each coating system and components specified.

14 SUBMIT SAMPLES for each type and color of finish-coat material indicated, with texture to simulate actual
16 conditions. Provide stepped samples, defining each separate coat, including block fillers and primers. Resubmit
18 until required sheen, color, and texture are achieved. Provide a list of materials and applications for each coat of
each Sample.

Sample size: 4-inch x 4-inch or larger of each color and texture

QUALITY ASSURANCE

22
24 INSTALLER QUALIFICATIONS: An installer with a minimum of 5 years demonstrable experience in installation
26 of coating systems by the manufacturer utilized. Installer's responsibilities include furnishing skilled technicians
specifically trained and experienced with application of the finishes required.

28 SOURCE LIMITATIONS: Obtain crack fillers, primers and other undercoat materials from same manufacturer as
30 finish coats.

32 FINISH MOCKUP: Prepare a 200 SF finish mockup of the required textured finish(es) to demonstrate typical
34 surface texture, color, and standard of workmanship. Notify Owner/Architect seven days in advance of dates and
36 times when wall-finish mockup will be constructed. Obtain Owner/Architect's approval of mockup before starting
construction. Maintain mockups during construction in an undisturbed condition as a standard for judging the
completed Work. Approved finish-mockup(s) may become part of the completed Work if undisturbed at time of
Substantial Completion.

DELIVERY, STORAGE, AND HANDLING

38
40 DELIVER MATERIALS to Project site in manufacturer's original, unopened packages and containers bearing
42 manufacturer's name and label, and with the following information: product name or title of material; manufacturer's
44 stock number and date of manufacture; contents by volume, for pigment and vehicle constituents; thinning
instructions (if permitted); application instructions; color name and number; handling instructions and precautions;
and VOC content.

46 STORE MATERIALS not in use in tightly covered containers in a well-ventilated area at a minimum ambient
48 temperature of 45 deg F. Maintain storage containers in a clean condition, free of foreign materials and residue.
Protect coating materials from freezing. Keep storage area neat and orderly. Remove cleaning rags and waste daily.

PROJECT CONDITIONS

52
54 APPLY COATINGS only when temperature of surfaces to be coated and surrounding air temperatures are between
56 50 and 90 deg F, unless otherwise permitted by manufacturer's written instructions. Do not apply coatings in snow,
rain, fog, or mist; when relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew
58 point; or to damp or wet surfaces.

60 ALLOW WET SURFACES TO DRY THOROUGHLY and attain temperature and conditions specified before
starting or continuing coating operation.

PART 2 - PRODUCTS

62
64 PRODUCT / MANUFACTURER: This specification is based on products as manufactured by "STO Corporation".
66 Subject to compliance with requirements, equivalent products of the following manufacturers are also acceptable:
Dryvit Systems, Inc.

Senergy Inc.; SKW-MBT Construction Chemicals.

OTHER MANUFACTURERS may be proposed only as a substitution request as required in Division-1 Sections.

COLORS, TEXTURES, AND PATTERNS OF FINISH COAT: As selected by Architect from manufacturer's full range. Provide the quantity of different colors and textures as indicated within the color/materials schedule in the Drawings, or if not indicated, provide up to three (3) different colors and textures throughout project with no additional cost for "special colors" or "color matching".

COATING MATERIAL COMPATIBILITY: Provide crack fillers, block fillers, primers, finish-coat materials, and related materials that are compatible with one another and substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

CRACK FILLER: Factory-formulated cement-based one-component polymer-modified patching mortar reinforced with fibers to prevent cracking, compatible with substrate and finish-coat materials indicated, and intended for trowel application:

"Sto Skim Coat" or equal

REINFORCING MESH: Balanced, alkali-resistant, open-weave glass-fiber mesh treated for compatibility with other materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. per EIMA 105.01, complying with ASTM D 578 and the following requirements for minimum weight:

Typical Detail Reinforcing Mesh at foam trim: Not less than 4.5 oz./sq. yd.

PRIMER: Manufacturer's standard factory-mixed elastomeric-polymer primer for preparing concrete surface for application of finish coat – tinted to match color of finish coat:

"Sto Primer" or equal

TEXTURED FINISH-COAT: Manufacturer's standard acrylic-based factory mixed formulation of polymer-emulsion binder, integral colorfast pigments, sound, graded marble aggregates, and fillers, with waterproof clear acrylic based sealer for protecting finish coat:

"Sto-Medium Sand " or equal medium-sand textured coating.

PART 3 - EXECUTION

EXAMINE SUBSTRATES and conditions, with installer present, for compliance with requirements for coating application. Proceed with coating application only after unsatisfactory conditions have been corrected and surfaces are thoroughly dry. Start of coating application will be construed as Applicator's acceptance of surface conditions.

PREPARATION

REMOVE ITEMS already installed that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating. After completing coating operations, reinstall items removed, using workers skilled in trades involved.

CLEAN SUBSTRATES of substances that could impair bond of coating systems before applying coatings or other surface treatments. Remove oil and grease before cleaning. Schedule cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.

CLEAN AND PREPARE SURFACES to be coated according to manufacturer's written instructions for particular substrate conditions and as specified. Provide barrier coats over incompatible primers or remove and reprime. Remove efflorescence, chalk, dust, dirt, release agents, grease, oils, and similar impediments to good adhesion by water blasting followed by a clear water rinse. Remove mildew and neutralize surfaces according to manufacturer's written instructions before patching materials are applied. Roughen as required to remove glaze. Use abrasive blast-cleaning methods if recommended by coating manufacturer.

DETERMINE ALKALINITY AND MOISTURE CONTENT of surfaces to be coated by performing appropriate tests. If surfaces are sufficiently alkaline to cause finish paint to blister and burn, correct this condition before application. Do not apply coatings over surfaces where moisture content exceeds that permitted in manufacturer's written instructions.

FILL CRACKS according to manufacturer's written instructions before coating surfaces. Remove dust and dirt from around cracks. Remove mildew by sterilizing before filling. Apply crack filler primer recommended by manufacturer with a brush to obtain uniform coverage and spread approximately 2 inches on each side of cracks. Fill cracks with manufacturer's recommended crack filler applied with a putty knife or trowel, and allow for shrinkage. If excessive shrinkage occurs, reapply crack filler.

MATERIAL PREPARATION

2
4 MIX AND PREPARE MATERIALS according to coating manufacturer's written instructions. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.

6 STIR MATERIALS before application to produce a mixture of uniform density. Stir as required during application. If surface film forms, do not stir film into material. If necessary, remove film and strain coating material before using. If manufacturer permits thinning, use only thinners recommended by manufacturer, and only within recommended limits.

GENERAL APPLICATION REQUIREMENTS:

12
14 APPLY COATINGS according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied to comply with colors and textures as indicated on the Drawings.

16 DO NOT COAT over conditions detrimental to formation of a durable coating film, such as dirt, rust, scale, grease, moisture, and scuffed surfaces.

20 PROVIDE FINISH COATS compatible with primers used. Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration. Do not apply succeeding coats until previous coat has cured as recommended by manufacturer.

24 ALLOW SUFFICIENT TIME BETWEEN SUCCESSIVE COATS to permit proper drying. Do not recoat surfaces until coating has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat does not cause undercoat to lift or lose adhesion.

28 IF UNDERCOATS OR OTHER CONDITIONS show through final coat, apply additional coats until coating film is of uniform finish, color, and appearance. Ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.

TEXTURED COATING APPLICATION:

34
36 APPLY MATERIALS according to manufacturer's written instructions. Use airless spray equipment with orifice size as recommended by manufacturer for material and texture required. Do not double back with spray equipment, building up film thickness of two coats in one pass.

38 APPLY PRIMER to substrate before applying finish coats.

40
42 SPRAY APPLICATION OF FINISH COAT: Typically, install finish coat with spray equipment in compliance with manufacturer's written instructions and per requirements of authorities having jurisdiction. Match approved samples for color, texture, and coverage. Remove, refinish, or recoat work not complying with specified requirements.

CLEANING

46
48 CLEANUP: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

50
52 AFTER COMPLETING COATING WORK, clean glass and spattered surfaces. Remove spattered coatings by washing, scraping, or other methods, being careful not to scratch or damage adjacent finished surfaces.

END OF SECTION 09 97 26

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 PROVIDE signage to comply with requirements indicated for manufacturing process, material finishes, style, size
8 and message content, as specified herein, and as required for a complete and proper installation. Types of signage
required include to the following:

- 10 Exterior building address numbers
- 10 Fire-sprinkler control-valve room door signage
- 10 Service door signage
- 12 Handicapped parking signs (RE Civil Drawings for requirements)
- 12 Maximum Occupancy Sign
- 14 ADA Pictorial Door Signs

16 INSTALL INTERIOR SIGNAGE furnished by the Owner.

18 **SEPARATE CONTRACT:** The Owner will arrange for the following signage to be provided by others:

- 18 Monument (or pole type) site sign
- 20 Exterior Building signage

22 BUILDING SIGNAGE COORDINATION:

24 COORDINATE with the Owner's separate Sign Contractor regarding field dimensions, shop drawings, site access,
26 scheduling, power requirements, and other items necessary for timely installation of signs.

28 COORDINATE WITH THE WORK OF DIVISION-16 SECTIONS to verify that electrical junction boxes for signs
30 are located appropriately. Final connection of electrical transformer or ballast to electrical junction box is a part of
the Work of Division-16 Sections.

32 SUBMITTALS:

34 SHOP DRAWINGS: Submit shop drawings of all signage required herein to the Owner prior to fabrication and
36 installation. Include elevations and large scale details, where applicable. Show anchorages to other materials, and
38 accessory items, as applicable.

PART 2 – PRODUCTS

40 PRESSURE SENSITIVE VINYL (PSV): "220 Scotchcal" by 3M or equal 2 mil minimum thickness, opaque, non-
42 reflecting, cast PVC film with pressure sensitive adhesive backing, suitable for exterior applications, colors as noted
in material-color schedule. Die-cut copy from PSV, mount on paper backing sheet.

44 BUILDING NUMBERS: 8" high white reverse-mount to interior side of glass facing main street

46 FIRE-SPRINKLER ROOM DOOR SIGN: 1-1/2" High "RED" colored PSV letters reading:
48 "FIRE-SPRINKLER VALVE"
(verify exact text with AJH)

50 SERVICE DOOR SIGN: 1-1/2" High PSV letters reading:
52 "(NAME OF BUSINESS)
54 Accepting Deliveries only between:
XX:XX - XX:XX AM
&
56 XX:XX - XX:XX PM"
(verify actual name and times with Owner's representative)

58 ADA INTERIOR PICTORIAL SYMBOL SIGNAGE: 8 x 8 x 1/8 inch minimum radius cornered Pictorial Symbol
60 Signs, with 1/32" raised pictogram symbols, 1/32" x 5/8" high upper case raised letter text, and with 1/32" 24 point
62 Grade II Braille text. Text and pictogram to be white on dark colored matte finished sign panel in color as selected
by Architect. Provide double sided 1/32" thick Scotchmount tape for attaching at 60" above floor to center of sign
on the wall adjacent to the latch side of a door:

- 64 1 ea: MEN
- 64 1 ea: WOMEN

PART 3 – EXECUTION

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14
- INSTALL signage in accordance with the approved shop drawings, to be level, plumb, and at height indicated, free from distortion or other defects of appearance. Remove and reinstall signage materials that do not comply with these requirements.
- MOUNT plastic laminate signs directly to wall surface adjacent to door frame. Use double-sided foam tape to mount to smooth non-porous surfaces.
- TOUCH-UP PAINT all exposed surfaces damaged during installation, to match color of adjacent painted surfaces.
- CLEAN soiled sign surfaces and protect units from damage until acceptance by the Owner.
- END OF SECTION 10 14 00**

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide fire extinguishers throughout the project, as specified herein, and as required for a
8 complete and proper installation.

10 SUBMIT PRODUCT DATA for each type of product specified. For fire extinguisher cabinets include rough in
12 dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door
14 hardware, cabinet type and materials, trim style, door construction, panel style, and materials.

16 SUBMIT MAINTENANCE INSTRUCTIONS including service recommendations.

18 SINGLE-SOURCE RESPONSIBILITY: Obtain fire extinguishers and cabinets from one source from a single
20 manufacturer.

22 COORDINATION: Coordinate accessory locations, installation, and sequencing with other work to avoid
interference with and ensure proper installation, operation, adjustment, cleaning, and servicing.

UL-LISTED PRODUCTS: Fire extinguishers UL-listed and bear UL "Listing Mark" for type, rating, and
classification of extinguisher.

PART 2 - PRODUCTS

24 PROVIDE fire extinguishers where indicated on the drawings, or if not indicated, provide units spaced with no more
26 than 75 feet travel distance from any potentially occupied location inside the building area(s), in compliance with
28 requirements of governing authorities.

30 TYPICAL FIRE EXTINGUISHERS (FE): Manufacturer's standard multipurpose dry chemical type unit, 10 lb
32 capacity, UL rated: 4A-60BC equal to JL "Cosmic 10E" # MB846. Provide wall bracket except where indicated to
be located within a cabinet (FEC) on the Drawings.

34 KITCHEN FIRE EXTINGUISHERS (KFE) at cooking area(s): Manufacturer's standard wet-chemical type, 15 lb,
36 UL rated: for "Class K" (liquid cooking media) equal to JL "Saturn 15" # MB810.

38 FIRE EXTINGUISHER CABINET (FEC): Provide JL "Ambassador" # 1016-W-17 (4-1/2" recessed unit with 1-
40 1/2" projection of 10-1/2" W x 6" D x 24" H tub size with contemporary door, clear tempered glass panel, Saf-T-
42 Lok handle, and cylinder lock with flexible cam) with optional black epoxy painted tub, door and trim and with
optional vertical die-cut lettering in red color or approved equal. Provide typical fire-extinguisher in cabinet unless
otherwise indicated.

44 MOUNTING BRACKETS: Provide brackets designed to prevent accidental dislodgement of extinguisher, of sizes
46 required for type and capacity of extinguisher indicated in plated finish. Provide brackets for extinguishers not
located in cabinets and for those located in cabinets, where indicated or required.

48 WALL SIGN: Provide manufacturer's standard red-letter sign applied to wall surface above each bracket mounted
fire extinguisher, in compliance with authorities having jurisdiction for letter style, color, size, spacing, and location.

PART 3 - EXECUTION

52 INSTALL ITEMS included in this section in locations and at mounting heights indicated, or if not indicated, at
54 heights to comply with applicable regulations of governing authorities.

56 WHERE EXACT LOCATION of surface-mounted cabinets and bracket-mounted fire extinguishers is not indicated,
locate as directed by Architect.

END OF SECTION 10 44 00

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
 4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Design and provide custom fabricated decorative awnings in locations and as in the style(s)
 8 indicated in the Drawings, as specified herein for fabrication and materials, and as necessary for a complete installation.

10 RELATED SECTIONS: The following Sections contain requirements that relate to this Section:
 12 Division 5 Section "Metal Fabrication" for design, fabrication and welding of metal framework.

14 SUBMIT SHOP DRAWINGS and calculations signed and sealed by a licensed Professional Engineer registered in
 the State in which the project is located prior to fabrication or erection. Include elevations and large scale details of
 fabrication, where applicable. Show anchorages to other materials, and accessory items.

PART 2 - PRODUCTS

18 METAL TUBING: Comply with Division-5 Section "Metal Fabrications" for requirements of structural design
 20 (design/build), metal materials, and fabrication. At exterior applications, provide galvanized coated materials equal to "Gatorshield" by Allied Mechanical Tube Div. with yield strength of 50,000 PSI min.

22 MINIMUM SIZES: Comply with the following for minimum member sizes – provide members as required by
 Structural Design of Awning Framing:

	EXTERIOR
24 Steel tube Rib & frame members:	1 x 1 x .060"
26 Steel tube horizontal rails:	1 x 1-1/2 x .060"
28 Spreader bars & tie rails:	1/2" steel rod

AWNING FABRIC: Provide material in color(s) as noted on the Drawings with dacron polyester thread, edging,
 rope & welting, and # 2 spur brass gromets as required by awning design.

32 MISCELLANEOUS MATERIALS: Provide tie rope, extruded aluminum C-rail for fabric attachment at head of
 34 awning, and other materials not specifically described but required for a complete installation.

FABRICATION:

38 SPACE frames no more than 4'-0" OC, with triangulated frame webs whenever possible. Locate horizontal rails
 40 between frame webs at head, bottom, front, and projecting side, when applicable, 4'-0" OC max. spacing. Locate
 spreader bars horizontally or vertically, in accordance with the awning design.

42 WELD ALL JOINTS in frames, and between frames to rails or spreader bars. Grind smooth all welds in contact
 44 with awning fabric. Attach punched flat-bar tabs to the frame at 4'-0" OC max., for secure anchorage. Touch-up
 galvanized finish of exterior frames after welding, and paint entire awning frame to match predominate color of
 awning fabric. Comply with requirements in Section 09900 for painting Work included herein.

46 SEW AWNING FABRIC so that seams or welts align with frame or rail locations. At grommet hems, fold over
 48 fabric twice and double-stitch both edges. Attach grommets at intervals not to exceed 6" OC, unless otherwise
 50 required by awning design. At bottom flaps, provide finished fabric on both inside and outside face of flap, with
 bottom edge welted in profile noted on the Drawings. Apply letters to awning fabric after seaming is completed.

PART 3 - EXECUTION

54 EXAMINE adjacent Work for verification of installation tolerances and for compliance with other requirements and
 56 conditions affecting installation. Verify critical dimensions, and examine supporting structure and other conditions
 have been corrected.

58 INSTALL awning frame in accordance with approved shop drawings, to be level, plumb, and at height indicated.
 60 Attach awning fabric to frame, tightly stretched, free from distortion or other defects of appearance. Remove and
 62 reinstall materials that do not comply with these requirements.

END OF SECTION 10 73 13

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide bird control devices where indicated on the Drawings, as specified herein, and as
8 required for a complete and proper installation.

10 SUBMIT PRODUCT DATA for each device required, including construction details relative to materials,
12 dimensions, metal thicknesses, profiles, mounting method, specified options, and finishes.

14 SINGLE-SOURCE RESPONSIBILITY: Obtain products of this Section from one source from a single
16 manufacturer.

COORDINATION: Coordinate locations, and installation with other work to avoid interference with and ensure
proper installation.

PART 2 - PRODUCTS**MATERIALS:**

Rods: 316 Stainless Steel

Base: 316 Stainless Steel Strip or ultra-violet stabilized polycarbonate.

ACCEPTABLE MANUFACTURERS:

Bird-B-Gone Inc. (www.birdbgone.com), Toll-free Phone: 800-392-6915

Bird Barrier America, Inc; (www.birdbarrier.com); Toll-free Phone 800-503-5444

Nixalite of America Inc; (www.nixalite.com); Phone 800-624-1189

PRODUCT:

Bird-B-Gone's Bird Spike 2001 – 8" W x 24" long units typically

Bird Barrier's Bird-Flite Xtra-Wide: 8" W x 4.75" H x 13" unit length typically

Two (2) rows of Nixalite Model S units, 4" W x 4" H, in maximum length feasible, or approved equal

34 MOUNTING ADHESIVE: Manufacturer's recommended epoxy-based adhesive (Mechanical attachment is not
36 permitted to building components).

PART 3 - EXECUTION

38 INSTALL ITEMS included in this Section in locations indicated to comply with manufacturer's installation
40 recommendations.

42 CLEAN MOUNTING SURFACES with products as recommended by the product manufacturer, that will not harm
44 or discolor the substrate material, and allow to dry completely. The substrate surface should be free of peeling paint,
rust, bird droppings or any other debris.

46 ANCHOR FIRMLY IN PLACE with adhesive recommended by manufacturer – without penetrating sheet-metal
48 flashings or other water-resistive building-enclosure assemblies. Typically, apply 4-5 quarter sized dabs of mounting
50 adhesive to the base of each unit (per foot) and apply unit to the substrate. Allow devices to overhang ledges by
1/4", with tips up to 2.5" from a vertical element. Cover the complete horizontal surface, spacing units evenly with
not more than 2-1/2 inches between rows or ends of units (measured from the tip of the rods).

52 REPAIR AND REPLACE damaged or defective units, and add additional devices where open space exceeds 2-1/2"
54 in any location.

END OF SECTION 10 81 13

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide site-furnishings where indicated on the Drawings, as specified herein, and as
8 necessary for complete installation. The Work of this Section includes but is not limited to the following:

8 Ash receptacles
9 Bicycle racks
10 Bollards
11 Planters
12 Seating
13 Tables
14 Trash receptacles
15 Tree grates
16

REFERENCES

18 ASTM B-633: Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel

22 ASTM A500: Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in
24 Rounds and Shapes

SUBMITTALS

28 PRODUCT DATA: For each site furnishing, including function descriptions, materials, finish, dimensions and
30 installation and interface requirements.

32 SHOP DRAWINGS: Illustrating special installation requirements.

34 PRODUCT SCHEDULE: For site furnishings. Use same designations indicated on Drawings.

36 MAINTENANCE DATA: For site furnishings to include in maintenance manuals.

COORDINATION

40 COORDINATE INSTALLATION OF ANCHORAGES for the Work of this Section. Furnish setting drawings,
42 templates, and directions as applicable for installing anchorages, which may include sleeves, inserts, anchor bolts,
44 and items with integral anchors that are to be pre-installed or embedded in supporting substrates. Deliver such items
to Project site in time for installation.

PART 2 – PRODUCTS**MANUFACTURERS**

46 ACCEPTABLE MANUFACTURERS: Subject to compliance with requirements, provide products by one of the
48 following:

50 Barco Products; 11 North Batavia Ave., Batavia, IL 60510 (www.barcoproducts.com).
52 Forms+Surfaces; 6395 Cindy Lane, Carpinteria, CA, 93013, (www.forms-surfaces.com).
54 Huntco Supply; P.O. Box 10385, Portland, OR, 97296, (www.huntco.com).
56 Ironsmith; P.O. Box 10868, Palm Desert, CA, 92255, (<http://www.ironsmith.cc/index.htm>).
P.W. Athletic Mfg. Co. 140 N. Gilbert Road, MESA, AZ 85203 • (www.pwathletic.com)

58 PERFORATED METAL MESH BENCHES: Smooth curved seat, formed from single perforated metal mesh
Metal Framework: Constructed bench frames, armrests and handrails with minimum 7/8"-inch diameter
heavy wall steel tubing, with all connection points fully welded for maximum durability.
60 Perforated Steel: Form seats from .067 inch thick (14-gage) steel sheet with an overall pattern of .25"-inch
diameter perforations, with each perforated seat welded to the bench frame.
62 Exposed Metal Finish: TGIC polyester powder-coat applied by electrostatic or tribo-charged spraying,
64 baked in a curing oven to fuse the deposited powder forming a continuous, cross-linked coating, in
Manufacturer's full-range of finish-color options

Concealed Metal Undercoat: Electrodeposited zinc coating per ASTM B-633 with an additional Type II conversion coating, with a zinc-rich primer powder-coat based on epoxy resin pre-baked in preparation for final color coating.

Unit Length: 6'-feet.

Basis-of-Design Product: "Vista Bench", as manufactured by Forms+Surfaces, or an approved equal.

TABLES AND CHAIRS

Type: 45"-inch perforated metal top table with quad-leg, Vista Ensemble model #SEVIS-L5PAD. Five seat ensemble, backless perforated seats, ADA accessible, with umbrella hole and cover (color to match finish), freestanding version, as manufactured by Forms+Surfaces, or an approved equivalent with the following characteristics:

1. Metal: Ensemble Frame: 2.25"-inch diameter tubular steel; Seat Frame: 7/8"-inch diameter tubular steel; Center Hub: 2"-inch diameter tubular steel; Hardware: Stainless steel.

2. Perforated Seats and Table top: Seats are formed from 14-gauge steel sheet with an overall pattern of .25"-inch diameter perforations. Each perforated seat is to be welded to a tubular frame.

Finish: Metal Finishing – "Bright Silver"

2.04 BIKE RACKS

Bike Racks shall be the BR-100 in weathered wood color as manufactured by Barco Products, or an approved equivalent with the following characteristics:

1. Metal: Stainless steel connectors.

Recycled plastic: Remaining parts

Bike Racks shall be the Model # 1607-16 Heavy-Duty Standard Bike rack in galvanized steel as manufactured by Patterson Williams Athletic Mfg. Co., or an approved equivalent

ASH AND TRASH RECEPTACLE

Ash/Trash receptacle shall be Universal Receptacle model #SLUNI-36SOA, 36 gal round side opening receptacle, with powder coat finish, powder-coated aluminum exposed, sand ash lid with liner painted black and lid tether as manufactured by Forms+Surfaces, or an approved equivalent with the following characteristics:

Perforated Steel: Shall be .25"-inch round type perforated steel. Lid shall be designated per manufacturer's recommendation.

Liners: Include an independent and replaceable liner designed to be used with or without plastic litter bags. Liners are to be molded from black fire-rated LDPE polyethylene. Bag slots (to prevent litter bags from slipping) and liner drain holes shall be provided.

Finish: Powder-coat factory finish to match metal finishing.

ASH RECEPTACLE

Ash/Trash receptacle shall be Medium Buttler Ash Receptacle model # SUBUT-MDS or # SUBUT-MDW, with metal finish as manufactured by Forms+Surfaces, or an approved equivalent with the following characteristics:

Metal: Stainless steel or brush aluminum.

Capacity: 150-500 cigarette butts.

Mounting: Pole, wall or litter and recycling receptacle

PLANTERS

Planters shall be 30-gallon square/round planter model # SNUNS-30 or # SNUNI-30, with stainless steel finish as manufactured by Forms+Surfaces, or an approved equivalent with the following characteristics:

Metal: Stainless steel or brush aluminum.

Finish: Powder-coat factory finish or stainless steel. Submit color samples for approval by SNL Architect.

BOLLARDS

Break-away Bollards: Bollards shall be 3"-inch diameter, schedule 40 PVC pipe, 6'-foot in height.

Color: Painted Sherwin Williams, Toque White, SW7003.

Material: PVC plastic pipe.

Height: 6'-foot.

Permanent/Security Bollards, without light fixture: Bollards shall be Huntco 5"-inch square bollard, manufactured by Huntco Supply, or an approved equivalent; typically bollard caps are welded during fabrication, however if

security demands additional strength the caps can be removed and the bollard can be filled with concrete for added strength. Standard installation for bollards shall be in-ground; however surface mount and can be utilized upon approval by SNL Architect.

Color: If necessary, paint bollard to match campus surroundings. Submit color samples for approval by SNL Architect.

Material: Manufactured from ASTM A500 steel.

Height: 36"-inch.

Permanent/Security Bollards, with light fixture: Bollards shall be Knight Bollard model #L104 or Light Column Bollard model #L305, manufactured by Forms+Surfaces, (Model #L104 or Model #L305) or an approved equivalent.

1. Color: If necessary, paint bollard to match campus surroundings. Submit color samples for approval by SNL Architect.

2. Height: Minimum of 40"-inches.

TREE GRATES

Tree grate shall be Parkway Model, 48"-inch or 60"-inch square/round grate, manufactured by Ironsmith.

FABRICATION

METAL COMPONENTS: Form to required shapes and sizes with true, consistent curves, lines and angles. Separate metals from dissimilar materials to prevent electrolytic action.

WELDED CONNECTIONS: Weld connections continuously. Weld solid members with full-length, full-penetration welds and hollow members with full-circumference welds. At exposed connections, finish surfaces smooth and blended so no roughness or unevenness shows after finishing and welded surface matches contours of adjoining surfaces.

EXPOSED SURFACES: Polished, sanded or otherwise finished; all surfaces smooth, free of burrs, barbs, splinters, and sharpness; all edges and ends rolled, rounded or capped.

FINISHES

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 the 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.

ALUMINUM FINISHES: Manufacturer's standard, baked, polyester, powder-coat finish complying with finish manufacturer's written instructions for surface preparation, included pretreatment, application, baking and minimum dry film thickness.

BAKED-ENAMEL, POWDER-COAT FINISH (over galvanized steel material): Provide coating manufacturer's minimum 1.5 mil thick continuous, cross-linked enamel finish coating, consisting of TGIC polyester power applied by electrostatic or tribo-charged spraying, then baked in a curing oven to fuse the deposited powder to the substrate, in full compliance with coating manufacturer's written instructions for pretreatment, application, minimum dry-mil thickness (if thicker) and baking procedures.

PVC FINISH (on galvanized steel material): Manufacturer's standard, UV-light stabilized, mold-resistant, slip-resistant, matte-textured, dipped or sprayed-on, PVC-plastisol finish, with flame retardant added; complying with coating manufacturer's written instructions for pretreatment, application and minimum dry film thickness.

STAINLESS-STEEL FINISH: Remove tool and die marks and stretch lines or blend into finish. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

PART 3 – EXECUTION

EXAMINE adjacent Work for verification of installation tolerances and for compliance with other requirements and conditions affecting installation. Verify critical dimensions, and examine supporting structure and other conditions under which the Work of this Section is to be installed. Proceed with installation only after unsatisfactory conditions have been corrected.

COMPLETE FIELD ASSEMBLY of site furnishings where required.

2 INSTALL units where indicated on the Drawings, using mounting methods and fasteners appropriate to substrate as
4 recommended by unit manufacturer, and in compliance with the manufacturer's instructions. Install units plumb and
6 level, firmly anchored in locations and at position indicated.

8 FASTENING TO IN-PLACE CONSTRUCTION: Provide anchorages and fasteners where necessary for securing
10 the Work of this Section to in-place construction. Provide threaded fasteners for concrete and masonry inserts,
12 toggle bolts, through-bolts, lag bolts, wood screws, and other connectors as appropriate.

14 INSTALL SITE-FURNISHINGS after landscaping and paving have been completed, unless otherwise indicated.

16 CLEANING

18 AFTER COMPLETION of site furnishing installation, inspect all components. Clean all exposed surfaces according
20 to manufacturer's recommendations after removing temporary labels and protective coatings, if any. Remove spots,
22 dirt and debris.

REPAIR DAMAGED FINISHES OR UNITS to match original finish or replace elements that cannot be restored to
their original finish at the Contractor's expense.

PROTECT UNITS from damage until acceptance by the Owner.

END OF SECTION 12 90 00

PART 1 - GENERAL

SHOW THE FOLLOWING ON THE DRAWINGS:

Schedule of required equipment items, with reference keynotes and sizes/dimensions noted

Location and configuration of all site furnishings

Special fastenings, attachments or anchoring

Location and size of expansion shields larger than 3/8 inch in diameter.

Connection details, if other than manufacturer's standard.S!

RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and Supplementary Conditions, and Division-I Sections of the Specifications, apply to this Section.

WORK INCLUDED: Provide Site Furnishings where indicated on the Drawings, as specified herein, and as necessary for complete installation. Refer to Drawings for listing of Site Furnishings, manufacturers, product numbers and finish/colors.

SUBMITTALS

SUBMIT PRODUCT DATA for each type of unit required, including manufacturer's specifications, details of construction, dimensions of individual components, profiles, finishes, and installation instructions indicating required mounting hardware and accessories.

SUBMIT SHOP DRAWINGS of custom-fabricated units to supplement product data requirements above, if manufacturer's standard product data is not sufficient to indicate the assembly detail or requirements of field assembly or installation.

SUBMIT MAINTENANCE DATA in form of manufacturer's printed instructions for cleaning and maintaining site furnishings.

QUALITY ASSURANCE

PROVIDE INSTALLATION AND ASSEMBLY DRAWINGS including unit dimensions, connections, bolting and anchoring details, templates, erection and installation directions, and requirements for attachments including thickness, type, grade, class of metal.

DELIVERY STORAGE AND HANDLING

COMPLY with manufacturer's recommendations for delivery, handling and storage.

INSPECT upon arrival at the job site for conformance with specified requirements and quantity.

PROTECT from corrosion, staining, and other damage. Store items in designated area free from contact with soil and weather. Remove and replace damaged items with new items.

COORDINATION

COORDINATE INSTALLATION OF ANCHORAGES for the Work of this Section. Furnish setting drawings, templates, and directions as applicable for installing anchorages. Provide anchor bolts, hardware, sleeves, concrete inserts, and other items with integral anchors that are to be pre-installed or embedded in supporting substrates. Deliver such items to Project site in time for installation.

PART 2 – PRODUCTS

MANUFACTURERS: Refer to Drawings for schedule of products and manufacturers

BASIC MATERIALS

PROVIDE MATERIALS that are standard products of a manufacturer regularly engaged in the manufacture of site furnishings, of a type with proven, satisfactory usage for not less than two (2) years.

METALS: Provide with factory drilled holes, free of excess weld and spatter. Metal components with holes that will not be filled by hardware or hidden by other components will be rejected.

Steel Shapes: ASTM A 36, ASTM A 500 and ASTM A 501.

Structural Tubing: ASTM A 500.

Steel pipe: ASTM A 53, Type E or S, Grade B;

Standard malleable iron fittings: ASTM A 47.

Perforated Steel Sheet: 0.067 inch thick (14 gage) minimum perforated steel sheet, electrostatically coated with two-component polyester enamel finish.

Gray cast iron: ASTM A 48 Class 30 or better, or recycled cast gray iron of ASTM A 48 Class 25 or better. Provide castings manufactured true to pattern and component parts that fit together in a satisfactory manner. Castings shall be of uniform quality, free from blowholes, porosity, hard spots, shrinkage, distortion, or other defects. Smooth castings shall be well-cleaned by sand or shot blasting.

Cast Aluminum: ASTM B 26 and ASTM B 108, manufactured true to pattern and component parts to fit together in a satisfactory manner. Provide castings of uniform form quality, free from blowholes, porosity, hard spots, shrinkage, distortion, or other defects. Smooth surfaces of castings by sand or shot blasting.

Aluminum Alloy Products: Conform to ASTM B 209/B for sheet plate, ASTM B 221/B for extrusions and ASTM B 26/B or ASTM B 108 for castings, as applicable. Provide aluminum extrusions at least 1/8 inch thick and aluminum plate or sheet at least 0.050 inch thick.

METAL SHEET: Bronze, copper, and other sheet metals shall conform to ASTM B 62.

CONCRETE: Provide ready-mixed concrete meeting ASTM C 94, with ASTM C 150 Portland Cement using 3/4 inch maximum size aggregate, minimum compressive strength of 3000 psi at 28 days, with ASTM A 615 reinforcing steel and ASTM A 185 welded wire fabric.

PLASTICS

Recycled Plastic: Material containing a minimum 85 percent recycled post-consumer product in conformance to EPA requirements, manufactured or fabricated with a maximum 1/4 inch deflection or creep in any member in conformance with ASTM D 648 and ASTM D 2990. Provide ultraviolet (UV) resistant and color stabilized polyethylene, with minimum 1/4 inch wall thickness, with all exposed edges smoothed, rounded, and free of burrs and points, resistant to fading, cracking, fogging, and shattering. Provide non-toxic material with no discernible contaminants such as paper, foil, or wood, and with no more than 3 percent air voids. Provide materials resistant to deformation from solar radiation heat gain. Recycled material including simulated lumber may not be used as a structural component of any site furnishings.

Extruded Acrylic Sheet: ASTM D 4802 Type I, regular, Type II, heat resistant, 1/4 inch thick, clear in color.

Cast Acrylic Sheet: FS L-P-391, Item A, [Type I, Heat resistant and ultraviolet light absorbing] [Type II, heat resistant], 1/4 inch thick, [clear] bronze in color.

LUMBER: Provide premium grade wood members free of knots; boards with eased edges and ends; and wood components with factory-drilled holes. Components with holes that will not be filled by hardware or hidden by other components will be rejected. Select wood products to withstand the climatic conditions of the region in which the site is located. Lumber grades shall meet manufacturers standards of the grading rules under which they are manufactured.

Lumber Standards: the following shall be the minimum acceptable grades for species used.

WWPA G-5 grading rules, [Douglas Fir] [Western Cedars],[Choice & Btr.] [Select or A & Btr.] per special western red cedar rules.

WCLIB 17 standard grading rules, [Douglas Fir] [Western Cedars], A & Btr.

SPIB 1003 grading rules, Southern Pine, C & Btr.

SCMA Spec standard specification, Cypress, C-Select.

RIS Grade Use standard specifications, Redwood, [Clear] [Clear All Heart].

NHLA Rules rules, [Cypress] [Teak], [B Finish] [Select or Btr.].

Moisture Content: Provide air-dry or kiln-dry lumber. Kiln-dry treated lumber after treatment. Provide maximum moisture content of wood products at time of delivery per manufacturers recommendations. If no manufacturer's standard exists, then moisture content shall be based on requirements for the product, grade and intended use.

Wood Preservative Treatment: Wood that is not naturally rot and insect resistant shall be treated with standard procedures. Creosote, pentachlorophenol, tributyl tin oxide shall not be used in conformance with ASTM F 1487. Ammonium Copper Quat (ACQ) shall not be used for surfaces likely to contact the skin of small children. AWWA C1 and AWWA C9, as applicable, and inspected in accordance with AWWA M2.

FIBERGLASS: Provide material consisting of a minimum of three (3) laminations of chopped glass fibers impregnated with isophthalic thermosetting polyester resin, minimum thickness of 1/8 inch and reinforced per manufacturer's standards. Provide 12-15 mil thick fade-resistant color-impregnated polyester gel coat finish, in color and texture as indicated from manufacturer's standards. Fiberglass items shall be resistant to cleaners, fertilizers, high power spray and salt.

2 PRECAST CONCRETE UNITS: Design precast units consisting of a mixture of cement, aggregates and mineral
4 colors suitable for exterior use, in size and type as indicated on the Drawings. Finish and color as indicated selected
from manufacturer's standards, and as follows:

Portland cement: ASTM C 150 Type I II or III.

Aggregate: ASTM C 33, maximum size: 3/4 inch.

Reinforcing steel: ASTM A 615

Galvanized wire mesh: ASTM A 185.

Integral color: ASTM C 979, pure mineral oxide, limeproof and non-fading.

Concrete Mix Design: Minimum 5000 psi 28 day compressive strength concrete, maximum five percent
(5%) absorption.

Admixture: ASTM C 260 for air-entrainment

14 GLASS FIBER REINFORCED CONCRETE (GFRC) UNITS: Provide factory-fabricated and finished units as
15 standard with the manufacturer indicated, in color and texture as indicated on the Drawings, and as follows:

16 Reference Standard: PCI MNL-128 recommended practice for glass fiber reinforced concrete, including
17 Appendix G, Polymer Modified Glass Fiber Reinforced Concrete Panels.

18 Cement: ASTM C 150 – single brand and type in all units, white or gray color consistent with final finish

19 Glass fiber: Three percent (3%) alkali- resistant (AR) glass fibers produced specifically for use in glass
20 fiber reinforced concrete.

21 Sand Aggregate: Clear silica sand aggregate passing No. 16 sieve; washed, dried and free from deleterious
22 materials, of a type with successful history of uses in GFRC fabrication and standard with the
manufacturer.

23 Admixture: Manufacturer's standard acrylic thermoplastic copolymer material

24 Concrete Mix Design: 3,000 psi minimum compressive strength at 28 day minimum with approximately
25 120 pcf density

26 Concrete Shell Thickness: between 3/8 to 5/8 inch

27 Facing Aggregates: ASTM C 33 (less gradation), clean, hard, durable, inert and free of staining and
28 deleterious materials; as required to match indicated finish color and texture.

29 Cement Color Compound: ASTM C 979, pure, non-fading mineral oxides, maximum ten percent cement
30 weight; as required to provide color indicated, without impairing strength of GFRC.

31 Acrylic Finish: ASTM D 4060 waterborne crosslinked acrylic 49.5 +/- two percent solids by weight
32 providing 1000 cycles per 0.0254 mm 1000 cycles per 0.001 inch resistance to abrasion.

33 Fabrication Tolerances:

34 Dimension: Plus or minus 1/8 inch in any direction, noncumulative.

35 Material Thickness: Plus 1/4 inch and minus 0-inch.

36 Total Unit Thickness: Plus 1/4 inch and minus 1/8 inch.

37 Insert Locations: Plus or minus 1/4 inch.

40 ACCESSORIES

41 PROVIDE MANUFACTURER'S STANDARD MATERIALS and accessories as required for assembly of units and
42 as indicated on the assembly drawings. Provide unexposed aluminum, stainless steel or steel plates, angles and
43 supports required for complete assembly. Separate dissimilar materials to prevent electrolytic action.

44 PROVIDE CONCEALED FASTENERS except where specifically approved; types as required for specific usage.

45 ANCHORS AND HARDWARE: Provide for fastening site furnishings securely in place and in accordance with
46 approved manufacturer's instructions. Provide anchor bolts, slotted inserts, expansion shields for concrete; toggle
47 bolts and through bolts for masonry; machine and carriage bolts for steel; through bolts, lag bolts and screws for
48 wood. Do not use wood plugs in any material. Provide non-ferrous attachments for non-ferrous metal. Make
49 exposed fastenings of compatible materials, generally matching in color and finish the fastenings to which they are
50 applied.

51 Anchor bolts: ASTM A 307.

52 Hardware: stainless-steel, brass, or galvanized steel in accordance with ASTM A 153 and compatible with
53 the material to which applied. All exposed hardware shall match in color and finish.

54 Anchor Brackets: 1/4-inch thick (minimum) galvanized steel angle anchoring brackets, 1-7/8 inch wide by
55 2 inches deep by 2 1/2 inches high typically (taller if required by unit), pre-drilled for bolting
56 furnishings to substrate.

57 Mounting hardware shall be concealed, recessed, and plugged.

58 Threaded Inserts and Expansion Anchors: Provide inserts recessed not less than 2.5 inches into concrete or
59 masonry. Pullout 198 pounds in concrete per ASTM E 488. Expansion shields shall conform to FS
60 A-A-1925, group II, type 4, class 1. Provide embedment required by manufacturer.

61 Lag Screws and Bolts: ANSI B18.2.1, type and grade best suited for the purpose.

62 Toggle Bolts: ANSI B18.2.1.

63 Bolts, Nuts, Studs and Rivets: ASME B18.2.2 or ASTM A 307.

64 Power Driven Fasteners: Follow safety provisions of ANSI A10.3.

65 Screws: ANSI B18.2.1, ASME B18.6.2, and ASME B18.6.3.

66 Plain Washers: ASME B18.22M ASME B18.22.1.

2 Beveled washers for American Standard beams and channels: square or rectangular, tapered in thickness,
and smooth.
4 Lock washers: ASME B18.21.2M ASME B18.21.1.

6 PRETREATMENT, PRIMING AND PAINTING

8 APPLY pretreatment, primer, and paint in accordance with manufacturer's printed instructions. On surfaces
concealed in the finished construction or not accessible for finish painting, apply an additional prime coat to a
10 minimum dry film thickness of 1.0 mil. Tint additional prime coat with a small amount of tinting pigment.

12 Nonferrous Metal Surfaces: Protect by plating, anodic, or organic coatings.

14 Aluminum Surfaces: Before finishes are applied, remove roll marks, scratches, rolled-in scratches, kinks,
stains, pits, orange peel, die marks, structural streaks, and other defects which will affect uniform
appearance of finished surfaces.

16 FABRICATION

18 FABRICATE AND DESIGN SITE FURNISHINGS to be free from sharp vertical edges or protruding elements,
20 and provide a minimum radius of 1/2 inch on all vertical edges – including but not limited to seat walls, containment
curbs and planters. Round-off horizontal edges, where practical.

22 FABRICATE BENCHES AND CHAIRS with no sharp edges or protruding hardware. Pitch seat surfaces to the
24 back a approximately 5 degrees, and slot to shed water. Seat shall overhang the support base by a minimum of 4
inches for heel space and to facilitate rising from a seating position.

26 Live Load for Seats: support a minimum 300 lbs per person

28 Live Load for Benches: not less than 200 pounds per square foot.

30 STEEL BENCH ARMS: 3/8 inch thick minimum by 3 inch wide conforming to ASTM A 653.

32 PLANTERS, WASTE & ASH RECEPTACLES: Provide units with removable semi-rigid plastic liner inserts, and
with integral weather protection, odor containment, and insect/animal-proofing. Provide anchors to resist
overturning by typical use, high winds, and animals.

34 Ash receptacles: Provide top-mounted fire-proof metal bowl or screen with sand-filled containers for ash
containment, with a minimum diameter of 8 inches, easily removable for cleaning.

36 Waste deposit openings: locate between 30-40 inches above ground surface, minimum 4 inches diameter
opening size with edges crimped, rounded and smoothed.

38 Planter Drainage: Provide a minimum of one drainage hole in the base of each planter and a minimum 1/8
40 inch space, in 2 locations, between the base of the planter and the supporting surface at all
planters.

42 Planter Bases: capable of supporting the weight of the planter filled with both the designated plant material
and fully saturated soil. The planter shall not crack, overturn, or sink below the existing grade.
44 Planters shall allow for future relocation.

46 TABLES: Fabricate with all exposed edges and corners rounded, eased or chamfered, and as follows:

48 Load Capacity: 200 pounds per square foot minimum

48 Height: between 29-30 inches from finished grade to surface of the top typically.

50 Vertical Clearance: 9 inch minimum between seat top to bottom edge of the table top, with a minimum of
18 inches of leg space under tables (measured from the inside edge of the seat top to the nearest
table support) and with a minimum of 18 inches from the end of the table top to the nearest
support leg.

52 Table Tops: Fabricate not to contain recesses that might hold water or food particles, in minimum width of
18 inches when utilized from one side only, or 36 inches minimum when utilized from two sides.

54 Wheelchair Accessibility: Provide a minimum clear space of 29 inches from the finished grade to the
underside of the table at the end of the table - minimum clear width of 34 inches.

56 TREE GRATES: Provide units of material and size as indicated on the Drawings, complete with metal angle frames
58 to match finish of grate.

60 BICYCLE RACKS: Provide powder coat finish in color as selected from manufacturer's standards, to accommodate
locking devices and secure, as a minimum, one wheel and part of the frame simultaneously. The spacing between
62 racks shall be a minimum of 24 inches. Provide precast concrete units with embedded galvanized metal hitching
loops.

66 COATINGS AND FINISHES

68 PROVIDE FINISHES as specified by the manufacturer or as otherwise indicated herein. Round, polish, sand or
otherwise ease exposed surfaces and edges. Provide non-toxic, non-glare, and corrosion-resistant coatings and
70 finishes, with exposed surfaces smooth and splinter-free.

2 GALVANIZING: Hot-dip galvanize after fabrication where practicable, when required to be either “galvanized” or
4 “zinc-coated”. Comply with ASTM A 123/A, ASTM A 153/A or ASTM A 653/A, as applicable. Tailings and sharp
6 protrusions formed as a result of the hot-dip process shall be removed and exposed edges burnished. Galvanize
anchor bolts, grating fasteners, washers and parts or devices necessary for proper installation, unless otherwise
indicated.

8 **ELECTRO-STATIC POWER-COATING: Prime with electrostatic galvanizing and finish with ultra-violet (UV)
resistant polyester powder-coating electrostatically applied and oven cured.**

10 **POLYVINYL-CHLORIDE (PVC) COATING: Prime with a clear acrylic thermosetting solution, preheated prior to
12 dipping. Provide ultra-violet (UV) stabilized and mold-resistant liquid polyvinyl chloride with an 85 durometer
14 hardness with a slip-resistant finish. Provide a minimum .080 inch thick coating (+/- 0.020 inch) on components by
dipping and cure.**

16 **WOOD FINISHES: Provide a minimum of two (2) shop coats of paint, varnish, sealer, or other approved
preservative coating, to seal all exposed surfaces.**

18 **PAINTS: Shop apply a minimum of two (2) coats of weather-resistant coating, resistant to cracking, peeling and
20 fading, in color indicated on the Drawings.**

22 PART 3 – EXECUTION

24 EXAMINE adjacent Work for verification of compliance with other requirements and conditions affecting
26 installation. Verify that finished grades and other operations affecting mounting surfaces have been completed prior
to the installation of site furnishings. Proceed with installation only after unsatisfactory conditions have been
corrected.

30 ASSEMBLY OF COMPONENTS:

32 DELIVER ITEMS knocked-down (KD) and ready for site assembly. Provide packaged components complete with
all accessories and hardware. If necessary, provide replacement accessories and hardware from the manufacturer -
34 substitute parts will not be accepted unless approved by the manufacturer.

36 ASSEMBLE SITE FURNISHINGS according to manufacturer's instructions. When site furnishings are assembled
at the site, assembly shall not interfere with other operations or pedestrian and vehicular circulation. Conceal
38 fastenings where practicable.

40 INSTALLATION

42 INSTALL units where indicated on the Drawings, using mounting methods and fasteners appropriate to substrate as
44 recommended by unit manufacturer, and in compliance with the manufacturer's instructions. Install units plumb and
level, firmly anchored in locations and at position indicated.

48 REPAIR / RESTORATION

50 TOUCH-UP GALVANIZED COATINGS with galvanizing repair method and paint conforming to ASTM A 780 or
52 by the application of stick or thick paste material specifically designed for repair of galvanizing. Clean areas to be
repaired and remove slag from welds. Heat surfaces to which stick or paste material is applied, with a torch to a
54 temperature sufficient to melt the metallic in stick or paste; spread the molten material uniformly over surfaces to be
coated and wipe the excess material off.

56 TESTING & INSPECTION:

58 TEST EACH INSTALLED UNIT to verify a secure and correct installation. A correct installation shall be according
60 to the manufacturer's recommendations. Measure the physical dimensions and clearance of each unit for compliance
with manufacturer's recommendations. Provide a written report describing results.

64 REPLACEMENT AND RE-INSTALLATION

66 REPLACE AND REINSTALL all site furnishings not complying with requirements of this Specification Section.
Provide replacement materials that are new and supplied by the original manufacturer at no additional cost to the
68 Owner. Replace all fasteners and anchors determined to be non-compliant with requirements.

2

CLEANING

4

CLEAN THE SITE of all materials associated with the installation upon completion. Remove all excess and waste materials and dispose of legally.

6

8

CLEAN EXPOSED SURFACES according to manufacturer's recommendations after removing temporary labels and protective coatings, if any exist. Surfaces shall be clean of dirt, stains, filings, and other blemishes occurring from shipment or from installation. Use cleaning methods and agents in accordance with manufacturer's instructions.

10

12

PROTECTION

14

PROTECT by providing temporary barricades and temporary signage until acceptance by the Owner.

16

END OF SECTION 12 93 00

18

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide concrete paving where indicated on the Drawings, as specified herein, and as
8 necessary for complete installation. Types of applications include but are not limited to the following:

Standard concrete pavement
Detectable-Warning panels

10 RELATED SECTIONS:

12 PREPARED BASE COURSE is specified in "Division-31 - Earthwork" section.

14 CONCRETE and related materials are specified in Division 3.

JOINT FILLERS AND SEALERS are specified in Division 7.

PART 2 - PRODUCTS

16 FORMS: Steel, wood, or other suitable material or size and strength to resist movement during concrete placement
18 and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects. Use
20 flexible spring steel forms or laminated boards to form radius bends as required.

22 COAT FORMS with a non-staining form release agent that will not discolor or deface surface of concrete.

24 WELDED WIRE MESH: Welded plain cold-drawn steel wire fabric, ASTM A 185. Furnish in flat sheets, not rolls,
26 unless otherwise acceptable to Architect.

28 REINFORCING BARS: Deformed steel bars, ASTM A 615, Grade 40.

30 JOINT DOWEL BARS: Epoxy coated steel bars, ASTM A 615, Grade 40. Cut bars true to length with ends square
and free of burrs.

32 PLASTIC EXPANSION CAPS: Furnish for one end of each dowel bar in expansion joints. Design caps with one
34 end closed and a minimum length of 3" to allow bars movement of not less than 1", unless otherwise indicated.

36 HOOK BOLTS: ASTM A 307, Grade A bolts, internally and externally threaded. Design hook bolt joint assembly
38 to hold coupling against pavement form and in position during concreting operations, and to permit removal without
damage to concrete or hook bolt.

40 CONCRETE MATERIALS: Comply with requirements of applicable Division-3 sections for concrete materials,
admixtures, bonding materials, curing materials, and others as required.

42 EXPANSION JOINT MATERIALS: Comply with requirements of applicable Division-7 sections for preformed
44 expansion joint fillers and sealers.

46 LIQUID-MEMBRANE FORMING CURING COMPOUND: Complying with ASTM C 309, Type I, Class A unless
other type acceptable to Architect. Moisture loss not more than 0.055 gr./sq. cm. when applied at 200 sq. ft./gal.:

48 CONCRETE MIX, DESIGN AND TESTING: Comply with requirements of applicable Division-3 Sections for
50 concrete mix design, sampling and testing, and quality control, and as herein specified.

52 DETECTABLE WARNING PANELS: 7/8 inch thick, 24 x 24 inch (typical) red-colored panels of high-strength
concrete with granite aggregate and pre-stressed with stainless steel tendons, and formed with truncated domes
meeting the American with Disabilities Act 4.29.2 Standards:

54 "CASTinTACT Detectable Warning Panel" in red color, available through Carter-Waters Corporation
(www.carter-waters.com).

PART THREE - EXECUTION

58 SURFACE PREPARATION: Remove loose material from compacted base course surface immediately before
60 placing concrete.

PROOF-ROLL prepared base course surface to check for unstable areas and need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.

FORM CONSTRUCTION:

SET FORMS to required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

CHECK FORMWORK for grade and alignment to following tolerances:

Top of forms: not more than 1/8" in 10'.

Vertical face on longitudinal axis: not more than 1/4" in 10'.

CLEAN FORMS after each use, and coat with form release agent as often as required to ensure separation from concrete without damage.

REINFORCEMENT: Locate place and support reinforcement as specified in Division- 3 sections, unless otherwise indicated.

CONCRETE PLACEMENT:

COMPLY with requirements of Division-3 sections for mixing and placing concrete, and as herein specified.

DO NOT PLACE CONCRETE until base course and forms have been checked for line and grade. Moisten base course if required to provide a uniform dampened condition at time concrete is placed. Do not place concrete around manholes or other structures until they are at required finish elevation and alignment.

PLACE CONCRETE using methods which prevent segregation of mix. Consolidate concrete along face of forms and adjacent to transverse joints with internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand-spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices.

USE BONDING AGENT at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

DEPOSIT AND SPREAD concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 2-hour, place a construction joint.

CURBS AND GUTTERS: Automatic machine may be used for curb and gutter placement at Contractor's option. If machine placement is to be used, submit revised mix design and laboratory test results which meet or exceed minimums specified. Machine placement must produce curbs and gutters to required cross-section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified.

JOINTS:

GENERAL: Construct expansion, weakened-plane (contraction), and construction joints true-to-line with face perpendicular to surface of concrete. Construct transverse joints at right angles to the centerline, unless otherwise indicated. When joining existing structures, place transverse joints to align with previously placed joints, unless otherwise indicated.

CONTRACTION (CONTROL) JOINTS shall be provided to section concrete into areas as shown on Drawings. Construct for a depth equal to at least 1/4 concrete thickness, as follows:

TOOLED JOINTS: Form in fresh concrete by grooving top portion with a recommended cutting tool and finishing edges with a jointer.

SAWED JOINTS: Form weakened-plane joints using powered saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut joints into hardened concrete as soon as surface will not be torn, abraded, or otherwise damaged by cutting action.

CONSTRUCTION JOINTS: Place construction joints at end of placements and at locations where placement operations are stopped for a period of more than 2-hour, except where such placements terminate at expansion joints. Construct joints as shown or, if not shown, use standard metal keyway-section forms.

EXPANSION JOINTS: Provide pre-molded joint filler for expansion joints abutting concrete curbs, catch basins, manholes, inlets, structures, walks and other fixed objects, unless otherwise indicated. Locate expansion joints at 50'

o.c. maximum, and where otherwise indicated. Extend joint fillers full- width and depth of joint, and not less than 2" or more than 1" below finished surface where joint sealer is indicated.

FILLERS AND SEALANTS: Comply with the requirements of applicable Division-7 sections for preparation of joints, materials, installation, and performance.

WET-SET INSTALLATION OF DETECTABLE WARNING PANELS:

COMPLY WITH all manufacturer's installation recommendations.

THICKENED SLAB ON DRAINAGE COURSE: Provide minimum four (4) inch drainage course under all concrete pavement and increase pavement thickness by one (1) inch in depth x six (6) inches all around area where panels will be installed. Pour and finish concrete pavement to proper slopes and grade elevations and screed-off top one (1) inch of wet concrete.

CUT OVERSIZED-PANELS to comply with curve on back-side of curb, or trim panels to wedge shape, if applicable.

PANEL APPLICATION: Dampen back of panels with clean water and parge with 1/8 inch mortar coat consisting of 2 parts cement plus 1 part sand and water. Press parged panels into fresh concrete and tap in-place to align with grade using a rubber mallet to insure 100% surface contact bonding. Align base of domes on panel surface with finished surface of adjacent concrete.

FINISHING AND SEALING: Trowel edge of adjacent concrete and finish with 1/8 inch radius edger. Maintain a 3/16 inch wide sealant joint between panels and between concrete pavement and panels, typically (in freezing climates only), and fill joint with polyurethane sealant to be flush. Clean concrete residue and excess sealant from panels with a damp sponge.

CONCRETE FINISHING:

SMOOTH SURFACE by screeding and floating, after striking-off and consolidating concrete. Use hand methods only where mechanical floating is not possible. Adjust floating to compact surface and produce uniform texture.

TEST SURFACE for trueness with a 10' straightedge, after floating, to a tolerance of 1/8" in 10'-0". Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.

WORK EDGES of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round to 2" radius, unless otherwise indicated. Eliminate tool marks on concrete surface.

COMPLETE SURFACE FINISHING after completion of floating and troweling when excess moisture or surface sheen has disappeared, as follows:

BROOM FINISH by drawing a fine-hair broom across concrete surface, perpendicular to line of traffic. Repeat operation if required to provide a fine line texture acceptable to Architect.

COARSE, NON-SLIP BROOM FINISH shall be provided on inclined slab surfaces, by scoring surface with a stiff-bristled broom, perpendicular to line of traffic.

DO NOT REMOVE FORMS for 24 hours after concrete has been placed. After form removal, clean ends of joints and point-up any minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Architect.

CURING:

PROTECT AND CURE finished concrete paving, complying with applicable requirements of Division-3 sections. Use membrane- forming curing and sealing compound or approved moist-curing methods.

ANTI-SPALLING TREATMENT: A second coat of curing and sealing compound may be used or an anti-spalling compound applied over concrete cured by continuous moist curing methods. Apply compounds to concrete surfaces no sooner than 28 days after placement, to clean, dry concrete free of oil, dirt, and other foreign material. Apply curing and sealing compound at a maximum coverage rate of 300 sq. ft./gallon. Apply anti-spalling compound in two sprayed applications. First application at rate of 40 sq. yds. per gal.; second application, 60 sq. yds. per gallon. Allow complete drying between applications.

REPAIRS AND PROTECTIONS:

- 2 REPAIR OR REPLACE broken or defective concrete, as directed by Architect.
- 4 DRILL TEST CORES where directed by Architect, when necessary to determine magnitude of cracks or defective
6 areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy adhesive.
- 8 PROTECT CONCRETE from damage until acceptance of work. Exclude traffic from pavement for at least 14 days
10 after placement. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
- 12 SWEEP CONCRETE PAVEMENT and wash free of stains, discolorations, dirt and other foreign material just prior
14 to final inspection.

END OF SECTION 32 13 13

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide stamped-cement concrete pavement where indicated on the Drawings, as specified
herein, and as necessary for complete installation. Types of applications include but are not limited to the following:

- 8 Standard "gray" concrete pavement
- Colored-cement concrete pavement
- 10 Mat-stamped textured and patterned pavement with colored-cement treatments
- Exposed aggregate-surfaced pavement
- 12 **Detectable-Warning panels**

14 RELATED SECTIONS include the following:

- 16 Division 7 Section "Joint Sealants" for joint sealants within stamped cement concrete pavement and at
isolation joints of stamped cement concrete pavement with adjacent construction.
- Division 3 Section "Cast-in-Place Concrete" for general structural applications of concrete.
- 18 Division 31 Section "Earthwork" for subgrade preparation, grading, and subbase course.

SUBMITTALS

- 22 Product Data: For each type of manufactured material and product indicated.
- 24 Design Mixes: For each stamped concrete pavement mix. Include alternative mix designs when
characteristics of materials, project conditions, weather, test results, or other circumstances
warrant adjustments.

QUALITY ASSURANCE

30 INSTALLER QUALIFICATIONS: An experienced installer approved for use by system manufacturer who has
32 completed stamped cement concrete pavement similar in material, design, and extent to that indicated for this
Project and whose work has resulted in construction with a record of successful in-service performance.

34 READY-MIXED MANUFACTURER QUALIFICATIONS: Manufacturer of ready-mixed concrete products
36 complying with ASTM C 94 requirements for production facilities and equipment.

38 SOURCE LIMITATIONS: Obtain each type or class of cementitious material of the same brand from the same
manufacturer's plant and each aggregate from one source.

40 COMPLY WITH ACI 301, "SPECIFICATION FOR STRUCTURAL CONCRETE," unless modified by the
42 requirements of the Contract Documents.

44 PAVEMENT MOCKUP: Cast pavement mockups of full-size panels of concrete pavements required to demonstrate
typical pattern, texture, surface finish, color, and standard of workmanship. Notify Architect seven days in advance
of dates and times when mockups will be constructed. Obtain Architect's approval of mockups before starting
46 construction. Maintain mockups during construction in an undisturbed condition as a standard for judging the
completed Work. Approved pavement mockups may become part of the completed Work if undisturbed at time of
48 Substantial Completion.

PART 2 - PRODUCTS

FORMS

52 Form Materials: Plywood, metal, metal-framed plywood, or other approved panel-type materials to provide
54 full-depth, continuous, true, and smooth exposed surfaces.

Use flexible or curved forms that will provide uniform curvature for curves of a radius of **100 feet** or less.

56 Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or
adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

STEEL REINFORCEMENT

60 Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

Reinforcing Bars: ASTM A 615/A Grade 60, deformed.

62 Steel Bar Mats: ASTM A 184; with ASTM A 615, Grade 60, deformed bars; assembled with clips.

Plain-Steel Wire: ASTM A 82, as drawn.

64 Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and
free of burrs.

2 Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing
3 bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's
4 "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced
5 concrete of greater compressive strength than concrete.

6 **CONCRETE MATERIALS**

7 Portland Cement: ASTM C 150, Type I or II, white or gray, as required to achieve color indicated on the
8 Drawings.

9 Fly Ash: ASTM C 618, Class F or C.

10 Aggregate: ASTM C 33 for Severe (S) climate severity, uniformly graded , nominal maximum aggregate
11 size: 3/4 inch.

12 Water: Potable and complying with ASTM C 94.

14 **ADMIXTURES**

15 General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride
16 ions by mass of cement and to be compatible with other admixtures. Do not use admixtures
17 containing calcium chloride.

18 Air-Entraining Admixture: ASTM C 260.

20 **COLOR MATERIALS**

21 **INTEGRAL COLOR PIGMENT:** ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing
22 admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis. The Design and
23 Documents are based on the use of specific colors of named manufacturer(s) indicated on the Drawings. Subject to
24 compliance with requirements, provide colored concrete pavement systems only by that entity, except as otherwise
25 approved for use by the Architect from the following alternative manufacturers:

26 Bayer Corporation.

27 ChemMasters.

28 Conspec Marketing & Manufacturing Co., Inc.

29 Davis Colors.

30 Elementis Pigments, Inc.

31 Hoover Color Corporation.

32 Lambert Corporation.

33 Scofield, L. M. Company.

34 Solomon Colors.

35 **COLORED-POWDER RELEASE AGENT FOR STAMPED CONCRETE:** Factory-packaged dry combination of
36 surface conditioning and dispersing agents interground with coloring pigments that facilitates release of stamp mats.
37 Use coloring pigments that are finely ground, nonfading mineral oxides interground with cement.
38 Color: As indicated by referencing manufacturer's designation.

40 **STAMPED CONCRETE IMPRINTING SYSTEM:**

41 **STAMP MATS:** Semirigid polyurethane mats with projecting textured and ridged underside capable of imprinting
42 texture and joint patterns on plastic concrete.

43 **PRODUCTS/MANUFACTURERS:** The Design and Documents are based on the use of specific patterns and colors
44 by manufacturer(s) indicated on the Drawings. Subject to compliance with requirements, provide stamped cement
45 concrete pavement systems only by that entity, except as otherwise approved for use by the Architect from the
46 following alternative manufacturers:

47 Bomanite Corporation.

48 Bon Tool Company.

49 Cobblecrete International, Inc.

50 Coloration Systems, Inc.

51 Increte Systems, Inc.

52 Patterned Concrete Industries, Inc.

53 Perma Building Products, Inc.

54 Quick Imprint Systems, Inc.

55 Rafco Products.

56 Scofield: L. M. Scofield Company.

57 Stampcrete International, Ltd.

58 Super Stone, Inc.

59 Symons Corporation.

61 **CURING AND SEALING MATERIALS**

62 Evaporation Retarders: Waterborne, monomolecular film forming, manufactured for application to fresh
63 concrete.

2 Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, as approved
 for use by system finishing manufacturer.
 4 Clear Acrylic Sealer: Manufacturer's standard waterborne, membrane-forming, medium-gloss, acrylic
 copolymer emulsion solution containing not less than 15 percent solids by volume; nonyellowing
 and UV resistant.

6 **DETECTABLE WARNING PANELS: 7/8 inch thick, 24 x 24 inch (typical) red-colored panels of high-strength
 8 concrete with granite aggregate and pre-stressed with stainless steel tendons, and formed with truncated domes
 meeting the American with Disabilities Act 4.29.2 Standards:
 10 "CASTinTACT Detectable Warning Panel" in red color, available through Carter-Waters Corporation
 (www.carter-waters.com).**

12 **RELATED MATERIALS**

14 Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.
 Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
 16 Epoxy-Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and
 bonding to damp surfaces, of class and grade to suit requirements, and as follows:
 18 Type II, non-load bearing, for bonding freshly mixed concrete to hardened concrete.
 Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

20 **CONCRETE MIXES**

22 Prepare design mixes, proportioned according to ACI 211.1 and ACI 301, for each type and strength of
 normal-weight concrete determined by either laboratory trial mix or field test data bases.
 24 Use a qualified independent testing agency for preparing and reporting proposed mix designs for the
 laboratory trial mix basis.
 26 Proportion mixes to provide concrete with the following properties:
 Compressive Strength (28 Days): 4000 psi.
 28 Maximum Water-Cementitious Materials Ratio: 0.50.
 Maximum Slump: 4 inches.
 30 Cementitious Materials: Limit percentage, by weight, of cementitious materials other than
 portland cement in concrete as follows:
 32 Fly Ash: 10 percent.
 Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of
 34 placement having an air content of 6.0 percent within a tolerance of plus 1.0 or minus 1.5
 percent.
 36 Add coloring admixture to mix according to manufacturer's written instructions.

38 **CONCRETE MIXING**

Ready-Mixed Concrete: Comply with ASTM C 94.
 40 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.

44 **PART 3 - EXECUTION**

46 **PREPARATION**

48 **PROOF-ROLL PREPARED SUBBASE** surface to check for unstable areas and to verify need for additional
 compaction. Proceed with pavement work only after noncomplying conditions have been corrected and subgrade is
 ready to receive pavement.

50 **REMOVE LOOSE MATERIAL** from compacted subbase surface immediately before placing concrete.

52 **PROTECT ADJACENT CONSTRUCTION** from discoloration and spillage during application of color hardeners,
 54 release agents, curing compounds, and sealers.

56 **EDGE FORMS AND SCREED CONSTRUCTION**

58 **SET, BRACE, AND SECURE EDGE FORMS, bulkheads, and intermediate screed guides** for pavement to required
 60 lines, grades, and elevations. Install forms to allow continuous progress of work and so forms can remain in place at
 least 24 hours after placing concrete.

62 **CLEAN FORMS AFTER EACH USE** and coat with form-release agent to ensure separation from concrete without
 64 damage.

66 **STEEL REINFORCEMENT**

2 COMPLY WITH CRSI'S "MANUAL OF STANDARD PRACTICE" for fabricating reinforcement and with
3 recommendations in CRSI's "Placing Reinforcing Bars" for placing and supporting reinforcement.

4 JOINTS

6 CONSTRUCT JOINTS AND TOOL EDGINGS true to line with faces perpendicular to surface plane of concrete.
8 Construct transverse joints at right angles to centerline, unless otherwise indicated.

10 CONSTRUCTION JOINTS: Set construction joints at side and end terminations of pavement and at locations where
11 pavement operations are stopped for more than one-half hour, unless pavement terminates at isolation joints.
12 Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement
13 through sides of strip pavement, unless otherwise indicated. Use a bonding agent at locations where fresh concrete is
14 placed against hardened or partially hardened concrete surfaces.

16 EXPANSION JOINTS: Form isolation joints of preformed joint-filler strips abutting concrete curbs, catch basins,
17 manholes, inlets, structures, walks, other fixed objects, and where indicated.

18 Locate expansion joints at intervals of 50 feet, unless otherwise indicated on the Drawings.

19 Terminate joint filler not less than 1/2 inch or more than 1 inch below finished surface if joint sealant,
20 specified in Division 2 Section "Pavement Joint Sealants," is indicated.

21 Furnish joint fillers in one-piece lengths for full width being placed where possible. Where more than one
22 length is required, lace or clip joint-filler sections together.

23 Protect top edge of joint filler during concrete placement with metal, plastic, or other temporary preformed
24 cap. Remove protective cap after concrete has been placed on both sides of joint.

26 CONTRACTION (CONTROL) JOINTS: Form weakened-plane contraction joints, sectioning concrete into areas as
27 indicated. Construct contraction joints for a depth equal to at least one-fourth of the concrete thickness, as follows:

28 **GROOVED (TOOLED) JOINTS:** Form contraction joints after initial floating by grooving and finishing
29 each edge of joint with groover tool to 1/4 inch radius. Repeat grooving of contraction joints after applying
30 surface finishes. Eliminate groover marks on concrete surfaces.

32 **SAWED JOINTS:** Form weakened-plane joints using powered saws equipped with shatterproof abrasive or
33 diamond-rimmed blades. Cut joints into hardened concrete as soon as surface will not be torn, abraded, or
34 otherwise damaged by cutting action.

35 Note that sawed joints are not permitted in stamped concrete pavement.

38 EDGING: Tool edges of pavement and joints in concrete after initial floating with an edging tool to 1/4 inch radius.
39 Repeat tooling of edges after applying surface finishes. Eliminate tool marks on concrete surfaces.

42 CONCRETE PLACEMENT

44 REMOVE SNOW, ICE, OR FROST from subbase surface and reinforcement before placing concrete. Do not place
45 concrete on frozen surfaces.

46 MOISTEN SUBBASE to provide a uniform dampened condition at the time concrete is placed. Do not place
47 concrete around manholes or other structures until they are at the required finish elevation and alignment.

50 COMPLY WITH RECOMMENDATIONS IN ACI 304R for measuring, mixing, transporting, and placing concrete.

52 DO NOT ADD WATER to concrete during delivery, at Project site, or during placement.

54 DEPOSIT AND SPREAD CONCRETE in a continuous operation between transverse joints. Do not push or drag
55 concrete into place or use vibrators to move concrete into place.

56 CONSOLIDATE CONCRETE with mechanical vibrating equipment. Use equipment and procedures to consolidate
57 concrete according to recommendations in ACI 309R.

60 SCREED PAVED SURFACES with a straightedge and strike off. Start initial floating using bull floats or darbies to
61 form a uniform and open-textured surface plane before excess moisture or bleedwater appears on the surface.

62 DO NOT FURTHER DISTURB CONCRETE SURFACES before starting finishing operations or spreading dry-
63 shake surface treatments.

64 COLD-WEATHER PLACEMENT: Comply with ACI 306.1. Protect concrete work from physical damage or
65 reduced strength that could be caused by frost, freezing actions, or low temperatures.

66 Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators, unless
67 otherwise specified and approved in mix designs.

HOT-WEATHER PLACEMENT: Place concrete according to recommendations in ACI 305R and as follows when hot-weather conditions exist:

Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Mixing water may be chilled 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.

Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.

Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

WET-SET INSTALLATION OF DETECTABLE WARNING PANELS:

COMPLY WITH all manufacturer's installation recommendations.

THICKENED SLAB ON DRAINAGE COURSE: Provide minimum four (4) inch drainage course under all concrete pavement and increase pavement thickness by one (1) inch in depth x six (6) inches all around area where panels will be installed. Pour and finish concrete pavement to proper slopes and grade elevations and screed-off top one (1) inch of wet concrete.

CUT OVERSIZED-PANELS to comply with curve on back-side of curb, or trim panels to wedge shape, if applicable.

PANEL APPLICATION: Dampen back of panels with clean water and parge with 1/8 inch mortar coat consisting of 2 parts cement plus 1 part sand and water. Press parged panels into fresh concrete and tap in-place to align with grade using a rubber mallet to insure 100% surface contact bonding. Align base of domes on panel surface with finished surface of adjacent concrete.

FINISHING AND SEALING: Trowel edge of adjacent concrete and finish with 1/8 inch radius edger. Maintain a 3/16 inch wide sealant joint between panels and between concrete pavement and panels, typically (in freezing climates only), and fill joint with polyurethane sealant to be flush. Clean concrete residue and excess sealant from panels with a damp sponge.

CONCRETE FINISHING

DO NOT WET CONCRETE SURFACES during screeding, initial floating, or finishing operations is prohibited.

FLOAT FINISH: Begin the second floating operation when bleedwater sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Finish surfaces to true planes. Cut down high spots and fill low spots. Immediately refloat surface to uniform granular texture.

COLORED DRY-SHAKE HARDENER FINISH (if applicable to stamped concrete product/manufacturer indicated): After initial floating, apply colored dry-shake material to plastic concrete surfaces according to manufacturer's written instructions.

COLORED-POWDER RELEASE AGENT (if applicable to stamped concrete product/manufacturer indicated): Uniformly distribute onto color-hardened and still-plastic concrete at a rate of 3 to 4 lb/100 sq. ft. or as otherwise recommended by manufacturer.

CONCRETE MAT STAMPING: While initially finished concrete is plastic, accurately align and place stamp mats in sequence. Uniformly load mats and press into concrete to produce required imprint pattern and depth of imprint on concrete surface. Remove stamp mats immediately. Hand stamp edges and surfaces unable to be imprinted by stamp mats. Remove unembedded release agent no fewer than three days after stamping concrete. High pressure wash surface and joint patterns, taking care not to damage stamped concrete. Control, collect, and legally dispose of runoff.

EXPOSED-AGGREGATE FINISH: Before final floating, apply aggregate finish where indicated to concrete pavement. Uniformly spread approximately 25 lb/100 sq. ft. of dampened aggregate over the freshly-poured surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface. After broadcasting and tamping, apply float finish. After initial curing, lightly work surface with a wire-brush or an abrasive stone, and water, to expose the aggregate.

CONCRETE PROTECTION, CURING, AND SEALING

2 PROTECT FRESHLY PLACED CONCRETE from premature drying and excessive cold or hot temperatures.
4 Comply with ACI 306.1 for cold-weather protection, and follow recommendations in ACI 305R for hot-weather
6 protection during curing.

8 EVAPORATION RETARDER: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions
10 cause moisture loss approaching 0.2 lb/sq. ft. x h before and during initial finishing operations. Apply according to
12 manufacturer's written instructions after placing and screeding and during initial floating operations.

14 CURING COMPOUND: Apply uniformly in continuous operation according to manufacturer's written instructions.
16 Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating
18 and repair damage during curing period.

SEALER: Apply uniformly in two coats in continuous operations according to manufacturer's written instructions.
Allow first coat to dry before applying second coat. Begin sealing dry surface no sooner than 14 days after concrete
placement.

PAVEMENT TOLERANCES: Comply with the following tolerances:

Elevation: 1/4 inch

Thickness: Plus 3/8 inch - minus 1/4 inch

Surface: Gap below 10-foot long, unleveled straightedge not to exceed 1/4 inch

Lateral Alignment and Spacing of Dowels: 1 inch.

Vertical Alignment of Dowels: 1/4 inch.

Alignment of Dowel-Bar End Relative to Line Perpendicular to Pavement Edge: Length of dowel 1/4 inch
per 12 inches.

Joint Spacing: 3 inches.

Contraction Joint Depth: Plus 1/4 inch - no minus.

Joint Width: Plus 1/8 inch, no minus.

REMOVAL AND PROTECTION

REMOVE AND REPLACE PAVEMENT that does not comply with requirements in this Section.

PROTECT PAVEMENT from damage. Do not permit construction traffic on concrete pavement. Exclude other
traffic from pavement for at least 28 days after placement.

MAINTAIN PAVEMENT FREE OF STAINS, discoloration, dirt, and other foreign material. Sweep pavement not
more than two days before date scheduled for Substantial Completion inspections.

END OF SECTION 32 13 16

PART 1 - GENERAL

2 RELATED DOCUMENTS: The Drawings, and general provisions of the Contract, including the General and
4 Supplementary Conditions, and Division-1 Sections of the Specifications, apply to this Section.

6 WORK INCLUDED: Provide brick unit paving where indicated on the Drawings, as specified herein, and as
8 necessary for complete installation. Types of applications include but are not limited to the following:

- 9 Clay Unit Brick Paving with sanded joints
- 10 ADA compliant tactile-warning unit paving

12 RELATED SECTIONS

- 13 Section 02751 – Cement Concrete Flatwork
- 14 Section 07900 – Joint Sealers.

16 REFERENCES

- 17 ASTM C 902 – Standard Specification for Pedestrian and Light Traffic Paving Brick; 2001a.

18 SUBMITTALS

19 MOCK-UP SUBMITTAL per requirements of this Section, and Division-1 Section “Quality
20 Requirements”.

21 Product Data: Provide product data showing characteristics of paver units, special shapes, dimensions, and
22 setting materials.

23 SHOP DRAWINGS: Submit shop drawings for pavers installation. Indicate on shop drawings, layout of
24 pavers, special design layout, dimensions of paved areas, elevations, and affected adjacent
25 construction.

26 SAMPLES: Submit two complete sample paver units of each type specified illustrating match with
27 Architect’s initial color charts and samples

28 MOCK-UP

29 CONSTRUCT A MOCK-UP of the brick pavers to depict the proposed installation, quality and workmanship
30 standards for the paver installation. No paver work shall begin until the Mock-Up has been accepted by the
31 Architect or Owner.

32 Size: 100 sq. ft.

33 Concrete subbase, filter fabric, sand bed, brick pavers, and accessories to pattern indicated.

34 Mock-up may remain as part of the Work.

38 **PART 2 - PRODUCTS**

39 PRODUCTS/MANUFACTURERS: Refer to Drawings for materials, size, color and manufacturers, in compliance
40 with the following:

41 CONCRETE PAVERS: Solid paving units complying with ASTM C 936 and resistant to freezing and thawing
42 when tested according to ASTM C 67, made from normal-weight aggregates. The design for masonry pavers is
43 based on use of the manufacturer’s product(s) indicated on the Drawings – other products must be approved in
44 advance by the Architect.

45 BRICK PAVERS:

46 ASTM C-1272, Weather Class SX, Traffic Type I, Wirecut in Texture.

47 Pattern: Running bond except as otherwise indicated on the Drawings

48 ADA DETECTABLE WARNING PAVERS: Provide units by same manufacturer of primary masonry pavers in
49 “red” color with truncated domes manufactured to comply with ADA requirements. Install with cement mortar (not
50 sand base) for installation.

51 STEEL EDGE RESTRAINTS: Painted steel edging minimum of 3/16 inch thick by 4 inches high with loops
52 pressed from or welded to face to receive stakes at 36 inches o.c., and steel stakes 15 inches long for each loop.

53 JOB-BUILT CONCRETE EDGE RESTRAINTS: Comply with requirements in Division 03 Section "Cast-in-Place
54 Concrete" for normal-weight, air-entrained, ready-mixed concrete with minimum 28-day compressive strength of
55 3000 psi.

56 AGGREGATE SETTING-BED MATERIALS

57 GRADED AGGREGATE FOR SUBBASE: Sound, crushed stone or gravel complying with ASTM D 2940,
58 subbase material.

GRADED AGGREGATE FOR BASE: Sound, crushed stone or gravel complying with ASTM D 2940, base material.

SAND FOR LEVELING COURSE: Sound, sharp, washed, natural sand or crushed stone complying with gradation requirements in ASTM C 33 for fine aggregate.

SAND FOR JOINTS: Fine, sharp, washed, natural sand or crushed stone with 100 percent passing No. 16 sieve and no more than 10 percent passing No. 200 sieve.

SAND FOR JOINT FILLER: ASTM C33 Clean washed river or bank sand containing maximum of 50 percent particle size of No. 50 sieve.

SEPARATION GEOTEXTILE (provide between soil subgrade and aggregate setting bed): Woven geotextile fabric, manufactured for separation applications; made from polyolefins or polyesters, with elongation less than 50 percent; complying with AASHTO M 288, with survivability rating of Class 2 per AASHTO M 288, apparent opening size of No. 60 sieve maximum per ASTM D 4751, permittivity of 0.02 per second minimum per ASTM D 4491, and UV Stability of 50 percent after 500 hours' exposure per ASTM D 4355.

HERBICIDE: Commercial chemical for weed control, registered with the EPA. Provide in granular, liquid, or wettable powder form

MORTAR SETTING-BED MATERIALS

Portland Cement: ASTM C 150, Type I or II.

Hydrated Lime: ASTM C 207, Type S.

Sand: ASTM C 144.

Latex Additive: Manufacturer's standard acrylic-resin or styrene-butadiene-rubber water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed Portland cement mortar bed, and not containing a retarder.

ACCESSORIES

Cleaning Solution: Type recommended by paver manufacturer.

Sealant: Urethane, self-leveling type as specified in Section 07900, including bond breaker.

PART 3 - EXECUTION

EXAMINATION

Verify substrate is ready to support pavers and imposed loads.

Verify gradients and elevations of substrate are correct.

Do not use unit pavers with chips, cracks, voids, discolorations, and other defects that might be visible or cause staining in finished work.

PREPARATION FOR AGGREGATE SETTING BED: Proof-roll prepared subgrade according to requirements in Division 31 Section "Earth Moving" to identify soft pockets and areas of excess yielding. Proceed with unit paver installation only after deficient subgrades have been corrected and are ready to receive subbase and base course for unit pavers.

PROVIDE EDGE RESTRAINTS as indicated, installed before placing unit pavers. Install edge restraints to comply with manufacturer's written instructions. Install stakes at intervals required to hold edge restraints in place during and after unit paver installation. For metal edge restraints with top edge exposed, drive stakes at least 1 inch below top edge. Install job-built concrete edge restraints to comply with requirements in Division 03 Section "Cast-in-Place Concrete."

AGGREGATE SETTING-BED APPLICATIONS

Compact soil subgrade uniformly to at least 95 percent of ASTM D 698 or ASTM D 1557 laboratory density.

Proof-roll prepared subgrade to identify soft pockets and areas of excess yielding. Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, and replace with compacted backfill or fill.

Place separation geotextile over prepared subgrade, overlapping ends and edges at least 12 inches.

Place aggregate subbase and base courses, and compact to 100 percent of ASTM D 1557 maximum laboratory density, and screed to depth indicated or if not indicated, not less than 4" per course.

2 Place leveling course and screed to a thickness between 1 to 1-1/2 inches, taking care that moisture content
remains constant and density is loose and constant until pavers are set and compacted.

4 Treat leveling course with herbicide to inhibit growth of grass and weeds.

6 Set pavers with a minimum joint width of 1/16 inch and a maximum of 1/8 inch, being careful not to
disturb leveling base. If pavers have spacer bars, place pavers hand tight against spacer bars. Use
8 string lines to keep straight lines. Fill gaps between units that exceed 3/8 inch with pieces cut to
fit from full-size unit pavers. If installation is performed with mechanical equipment, use only unit
pavers with spacer bars on sides of each unit.

10 Spread dry sand and fill joints immediately after vibrating pavers into leveling course. Vibrate pavers and
add sand until joints are completely filled, then remove excess sand. Leave a slight surplus of
sand on the surface for joint filling.

12 Do not allow traffic on installed pavers until sand has been vibrated into joints.

14 Repeat joint-filling process 30 days later.

16 **INSTALLATION – OVER CONCRETE FLATWORK**

Sweep substrate surface clean of loose matter.

18 Contractor to provide PVC weep holes or core drill holes through concrete subbase 36" o.c. each way, for
drainage purposes.

Filter fabric or filter screen to be laid over concrete subbase.

20 Contractor to provide 3/4" +/- sand setting bed on top of filter screen for brick pavers

Place paver units in pattern as shown on Drawings, from straight reference line (running bond).

22 Sprinkle sand over surface and sweep into joints. Moisten joints and recover with additional sand until
firm joints are achieved. Remove excess sand.

24 Provide sealants at expansion joints as shown on Drawings.

26 **INSTALLATION OF ADA DETECTIBLE PAVERS:**

28 Install in full depth of Portland Cement mortar (in lieu of sand bed) over concrete sub-base.

30 **CLEANING**

Do not clean pavers until pavers are dry.

32 Clean soiled surfaces using cleaning solution. Do not harm pavers, joint materials, or adjacent surfaces.

Use non-metallic tools in cleaning operations.

34 Rinse surfaces with clean water.

Broom clean paving surfaces. Dispose of excess sand.

36 **PROTECTION OF FINISHED WORK**

Do not permit traffic over unprotected paver surface.

38 Protect paver surface from construction traffic with sheets of plywood.

40 Do not permit any traffic for 48 hours after pavement placement.

END OF SECTION 32 14 16

SECTION 328400 - PLANTING IRRIGATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes furnishing all labor, materials, accessories and equipment, and performing all operations necessary for the complete installation of the landscape irrigation system, permits and including items listed below:
 - 1. Piping.
 - 2. Manual valves.
 - 3. Automatic control valves.
 - 4. Automatic drain valves.
 - 5. Spray heads.
 - 6. Quick couplers.
 - 7. Controller.
 - 8. Boxes for automatic control valves.
- B. Irrigation Control System
 - 1. The construction includes one (1) satellite controller as shown on the irrigation plans.
 - 2. Power shall be provided to the irrigation controller by electrical contractor. Final connection by irrigation contractor.
- C. All bids should reflect a total "turn-key" installation for the site. This would include all equipment necessary to install satellite controller, including necessary wiring, communications equipment, electrical service, water supply and lines needed to communicate with the irrigation control system. Each bid shall include all equipment and labor necessary to provide a "turn-key" installation.
- D. Each proposal shall include the cost to install a combination flow meter and master valve as indicated on the design drawings. This meter and valve shall be connected just past the water meter connection at each site. This meter and valve shall be capable of relaying this information to the irrigation control system point computer to provide flow information of each valve as it waters. It shall also be capable of detecting any flow that is occurring when no valves are operating, such as a broken main line would create. This flow sensor should then be capable of sending a signal to the irrigation control system that will then in turn close the master valve. The bid for each flow meter and valve shall include the meter/valve and any other items needed for a "turn-key" installation. The bid price for this meter and valve shall be shown as a separate bid item for this site.
- E. 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.

1.2 PERFORMANCE REQUIREMENTS

- A. Irrigation zone control shall be central control system with automatic operation with controller and automatic control valves.

- 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

1.3 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.

1.4 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.
- C. Approvals: Submit documentation of all approvals required by local, municipal, and state jurisdictions.
- D. Grounding and Line Surge Protection Verification: The Irrigation Contractor is to provide written documentation and verification that each grounding device meets the manufacturer's specified requirements for grounding and line surge protection. The tests shall be completed using an approved ground resistance tester. The Rain Bird ASP shall conduct testing.

1.5 INFORMATIONAL SUBMITTALS

- A. Controller Timing Schedule: Indicate timing settings for each automatic controller zone.
- B. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operational and Maintenance Data: Submit manufacturer's data in a three-ring binder, labeled and indexed

- B. 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.

1.7 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. The irrigation contractor shall provide written proof of attendance at a manufacturer's supported training program regarding the installation, programming and trouble-shooting for a Rain Bird IQ v4.0 decoder based irrigation control system. These qualifications must be present prior to any work beginning on this project.
- D. Authorized Service Provider requirements: Contractor shall have Authorized Service Provider (ASP) provide Rain Bird Commissioning irrigation control system including verification of specified Rain Bird Components, Correct wire and connectors, Grounding of required components, proper installation of communication and software has been set up with proper start-up and initial programming.
 - 1. Approved Rain Bird Authorized Service Provider/Central Control Service Provider
 - a. Irrigation Management Company (IMC) 816-215-1810
- E. Referenced Standards: American Society for Testing and Materials, Annual Book of ASTM Standards, latest edition.
- F. 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.
- G. Workmanship: Install materials and equipment in a neat and professional manner following manufacturer's recommendations.

1.8 FEES AND PERMITS

- A. Work under this Section shall include all fees, permits, licenses, and required inspections by concerned governing agencies.

1.9 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.

1.10 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.

1.11 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 from Rain Bird ASP stating that all installation, testing and training of the Irrigation Control System has been completed and approved. Notification shall be received prior to substantial completion.

B. All irrigation equipment including irrigation controller, 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.

1.12 TRAINING

A. A minimum of 2 hours of training, as determined by Rain Bird, for up to two (2) users determined by Owner and Landscape Architect shall be conducted by the ASP 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 both software and hardware 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, 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 3M 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 for potable water. PVC plastic pipe, ASTM D 2241 Class 200 SDR 21.
 1. All PVC pipe from sizes three (3) inches and above shall, unplasticized rigid polyvinylchloride (PVC) pipe with integral bell and rubber ring gasket unless otherwise specified.
 2. All PVC pipe from sizes two and one - half (2 1/2) to one (1) inch shall be Class 200, solvent weld PVC pipe.
 3. All pipe shall be supplied in standard twenty (20) foot lengths.
 4. Polyethylene pipe will not be accepted unless prior written approval is obtained by the landscape architect.
- B. Circuit Pipe for potable water (downstream from circuit valves): PVC plastic pipe, ASTM D 2241 Class 200 SDR 21.
 1. All PVC pipe from sizes three (3) inches and above shall, unplasticized rigid polyvinylchloride (PVC) pipe with integral bell and rubber ring gasket unless otherwise specified.
 2. All PVC pipe from sizes two and one - half (2 1/2) to one (1) inch shall be Class 200, solvent weld PVC pipe.
 3. All pipe shall be supplied in standard twenty (20) foot lengths.
 4. Polyethylene pipe will not be accepted unless prior written approval is obtained by the landscape architect.
- C. All pipe that is exposed or not below grade shall be Schedule 80 PVC or HDPE. Seamless Copper Pipe: ASTM B88, Type M, drawn temper.
- D. Sleeving Pipe for Potable Water Irrigation Supply Line: PVC plastic pipe, Schedule 40, ASTM D 1785 and D 1784, PS 21-70.
- E. Fittings:
 1. For PVC plastic pipe,
 - a. All pipe fittings size four (4) inches and greater shall be ductile iron.
 - b. 3" fittings shall be bell and rubber gasket.
 - c. Fittings 2-1/2" and under shall be Schedule 40 solvent weld PVC. 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 meter shall be sized as needed, and shall be provided per City specifications.

2.6 BACKFLOW PREVENTER

- ~~A.~~ Backflow preventer shall be of the type required by the local water supplier and local codes. Backflow preventer shall be sized to meet flow and pressure requirements of the plans.

2.7 IRRIGATION CONTROL SYSTEM SLEEVING

- A. 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.
- B. Sleeving material beneath pedestrian pavements shall be PVC Class 200 pipe with solvent welded joints.
- C. Sleeving beneath drives and streets shall be PVC Schedule 40 pipe with solvent welded joints.
- D. Sleeving diameter shall be equal to twice the diameter of the wiring bundle.

2.8 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, 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 IVM Series 1-1/2" 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 valves shall be sized to meet flow requirements shown on plans.
 - a. Potable irrigation system: Rain Bird PE-IVM series valves
- F. Pressure Regulating Module for regulating outlet pressure at control valve from 15 – 100 psi.
1. The pressure regulating module shall be a two-piece devise 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 waterproof and provide regulation if the valve is manually internal bled or electronically activated.
 3. The Pressure Regulating Module shall be Rain Bird PRS-D.
- G. Quick Coupling Valve: Brass, Single piece construction, one inch female iron pipe size connection; vinyl covered brass hinged locking cover.
1. Potable irrigation system: Yellow cap Rain Bird 44RC
- H. 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.
- I. Pressure Relief Valves: As manufactured by Waterman, or equal.
- J. 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/Brown Cover
- 3. Sizes:
 - a. 12" Standard; Rain Bird VB-STD
- K. Drainage Pit Backfill: Cleaned gravel or crushed stone, graded from 2" maximum to 3/4" minimum. AB3 or equivalent is not acceptable backfill material.

2.9 AUTOMATIC DRAIN VALVES

- A. Description: Spring-loaded-ball type of corrosion-resistant construction and designed to open for drainage if line pressure drops below 2-1/2 to 3 psig.

2.10 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 and 12" for planting beds: 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.

2.11 AUTOMATIC CONTROL SYSTEM

- A. The irrigation controller shall be a Rain Bird ESP-LXIVM 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 60 stations.
 - 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.
 - 4. The controller shall be compatible with the IQ v4.0 Central Control System utilizing IQ-NCC Network Communication Cartridges providing remote computer control of the controller via a variety of communication options (Direct Connect Cable, Phone, GPRS/Cellular, Ethernet, WiFi, Radio, and IQNet Communication Cable).
 - 5. Shall have the dimensions of:
 - a. Width: 14.32 in. (36.4 cm)
 - b. Height: 12.69 in. (32.2 cm)
 - c. Depth: 5.50 in. (14.0 cm)

- B. Surge Protection: Rain Bird Line Surge Protector IVM-SD (built in surge protection), required every 500' along two-wire path.
 - 1. Output power: Adjustable from controller – Inrush and holding current valves adjustable at controller.
 - 2. Encapsulation: Fully waterproof
 - a. 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)
 - 3. Electrical Output:
 - a. Max. voltage: 36 Vpp
 - 4. 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 Ohms/Km	3.00	1.86	12.00	7.46
14 AWG	2.58 Ohms/1000'	2.66	1.65	10.63	6.61
12 AWG	1.62 Ohms/1000'	4.23	2.63	16.93	10.52

- 5. Decoder/Solenoid Wires - Electrical Resistance: Max. 3 ohms
- 6. Max. Distance Decoder/Solenoids: Cable length: 14 gauge: 456 feet
- 7. Wiring: Paige special direct burial irrigation control cable,
- 8. Environment: Working range: 32° to 122° F (0° to 50° C); storage range: -4° to 158° F (-20 to 70° C); Humidity: 100%
- 9. Surge Protection: 40 V, 1.5 kW transil

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. No substitutions will be allowed.

2.13 SURGE PROTECTION FOR THE TWO-WIRE PATH

- A. An IVM-SD shall be installed on the 2-wire communication path at each ESP-LXIVM controller location.
 - 1. The Rain Bird™ IVM-SD 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 15 valves, whichever is smaller.
 - b. Install one (1) within controller cabinet.
 - c. The IVM-SD Line Surge Protector decoder shall be placed on a two-wire path.
 - d. The IVM-SD Line Surge Protector decoder shall be used for surge protection only, and shall not have a decoder address.
 - e. The IVM-SD Line Surge Protector decoder shall protect against 40V, 1.5kW transil.

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 FS150B— series

2.16 RAIN SENSOR

- A. Provide and install a wired Rain Bird Rain Sensor (RSD-BEx) capable of turning off the irrigation system if adequate rainfall is received.
- B. Contractor to install per Rain Bird's recommendations and specifications. Location to be approved by Landscape Architect.
- C. Rain 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 that does not exceed 53VA.

2.17 EQUIPMENT

- A. The following list of items shall be submitted to the Owner 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 effect 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, spray heads, rotors, 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 24" 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 for irrigation lateral lines shall be 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. Compact within 90% of the maximum density of the material used as determined by ASTM D-698 (Standard).
- 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.
 - 1. Under pavement areas contractor shall meet compaction requirements of pavement section plans and geotechnical report. Include flowable fill as required.
- 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 meter and backflow preventer have been installed in building. Ref: Building MEP plans.
- B. Install irrigation mainline tap at stub out provided by building MEP. Coordinate with site contractor.

3.6 MASTER VALVE 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.

3.7 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.

3.8 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.

3.9 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 24" below surface of paving. Sleeves shall extend a minimum of 12" behind back of curb. Permanently mark location of each end of sleeve on back of curb.

3.10 SPRINKLER 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.

3.11 CONTROLLER

- A. Controller shall be installed in permanent location as shown on plan and verified by Landscape Architect.
- B. Contractor shall properly programmed controllers 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 Weather Station, 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. 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.
- I. Install electrical connections between controller manufacturer's recommendations.
- J. Install all surge protection as per manufacturer's latest instructions.
- K. 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.
- L. 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. Install electrical connections between satellite control units and monitoring equipment per manufacturer's recommendations.
 6. Install all surge protection as per manufacturer's latest instructions.
 7. 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 Owner's Representative. Connect controller to grounding rod with AWG No. 10 solid conductor copper wire. Secure wire to grounding rod with brass or bronze clamp.
 8. Attach wire markers to the ends of control wires inside the controller unit housing. Label wires with an identification number that consists of the name and station number of the existing controller to which the control wire had been previously connected.
 9. 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.
 10. Connection to controller per manufacture recommendation.
- M. Irrigation Control System Setup
 1. All irrigation schedules and programming shall be set up per manufacture recommendations.
 2. Contractor shall set up all modules including connection to all site controllers and sensors.

3.12 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 pump and 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.

3.13 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.

3.14 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 one (1) electronic version of the irrigation record drawings.
- D. Submit to Owner one (1) ½ size reduction of the irrigation record drawing, laminated both sides, for inclusion into the inside of the controller door.
- E. Submit to Owner two (2) full size plan sets of the irrigation record drawings.

3.15 ACCEPTANCE

- A. The ASP 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 control system must be commissioned the ASP prior to final walk through of the system. The ASP shall confirm that the system is installed and grounded per the manufacture's recommendations. The Contractor shall address any system deficiencies found by the ASP prior to substantial completion.

3.16 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 warranties to the Owner. All manufacturer warranties shall be in effect for the period outlined in the manufacturer literature from the date of installation. Contractor shall detail these warranties 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. Sodding.

1.3 RELATED SECTIONS

- A. Section 328400 – Planting Irrigation
- B. 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. Before retaining "Personnel Certifications" Subparagraph below, verify availability of qualified individuals in Project area.
3. 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.
4. 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 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 Hounddog, Rebel, or Falcon Finebladed Turf Type Tall Fescue (*Festuca arundinaceae*), 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.

2.2 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.

2.3 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 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.
- 3.2 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 than 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.

3.3 SATISFACTORY TURF

- A. Turf installations shall meet the following criteria as determined by Landscape Architect:
 - 1. 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.

3.4 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 areas until the new irrigation system is completely functional and the letter of Substantial Completion has been issued. Contractor shall be responsible for watering sod 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 sod areas receive a minimum of one (1) inch of water per week. Sod 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 sod shall be watered as necessary to maintain adequate moisture.

END OF SECTION 329200

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. Mulches.
 - 3. Landscape edging.

1.3 RELATED SECTIONS

- A. Section 328400 – Planting Irrigation
- B. Section 329200 – Turf and Grasses

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 Feb 15 and May 31, and fall planting shall generally occur between September 1 and Dec 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.
- C. The "planter soil mixture" for all planters shall be 60% topsoil mixture, 10% peatmoss, 10% well composted manure and 20% clean sand. Mix thoroughly for uniformity of texture and distribution before placing in planter.

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.
- B. Rock Mulch: Mulch in all open landscape beds labeled as rock mulch shall be 1-1/2" to 3" Kansas River Rock as supplied by Riverbend Rock and Mulch, 15101 Industrial Dr., Independence, MO 64058, or approved equal. Contact number: 816.257.7625. Weed preventative fabric shall be included within rock areas.

2.7 WEED PREVENTATIVE FABRIC

- A. Place fabric below all rock mulch in plant beds. Fabric shall be a woven polypropylene, 3.5 to 4.0 ounce product.

2.8 EDGING

- A. Shrub bed edge adjacent to turf areas shall be black powder coat steel 3/16" x 4"x 16' edging as manufactured by Sure-Loc Edging. or approved equal. 1.800.787.3562
- B. Bed edging adjacent to concrete curb, pavement and sidewalk shall be manicured "V" edge per details.

2.9 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

2.10 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.

2.11 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.

2.12 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.

2.13 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.

2.14 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 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 diamond 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 edging as indicated on the drawings.
5. Mulching
 - 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 trunks 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 new 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.

END OF SECTION 329300