MCC Longview HT Addition + Renovation

500 SW LONGVIEW ROAD
LEE'S SUMMIT, MO 64081

BNIM Project #: 20008.00

PROJECT MANUAL

FOR

BID/PERMIT DOCUMENTS

SEPTEMBER 23, 2021

Prepared For:
Metropolitan Community College
of Kansas City
3200 Broadway
Kansas City, MO 64111

Prepared By:
BNIM
2460 Pershing Road
Suite 100
Kansas City, MO 64108

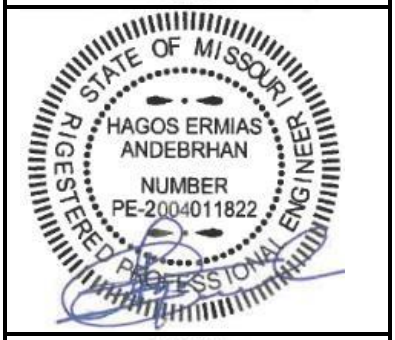
Project Team:
KH Engineering Group
Taliaferro & Browne
Lankford Fendler + Associates

SECTION 00 01 10

TABLE OF CONTENTS

DOCUMENT 00 01 07 - SEALS PAGE

DESIGN PROFESSIONALS OF RECORD

ARCHITECT	Jeremy Kahm BNIM Architects License No. A-2010035449 Divisions 02 to 14 Sections. except where indicated as prepared by other design professionals of record.	
CIVIL ENGINEER	Hagos Anderbrhan Taliaferro & Browne License No. PE-2004011822 The following Sections: 015720, 311000, 312000, 32216, 321313, 321373	
STRUCTURAL ENGINEER	Kathy J Hagen, PE KH Engineering Group, PA License No. E-2000155328 The following Sections: 031000, 032000, 033000, 051200, 053100	
FIRE-PROTECTION ENGINEER	Gregory J. Fendler Lankford Fendler + Associates License No. PE-2006037230 The following Sections: Divisions 21, 22, 23, and 26	

PLUMBING ENGINEER	Gregory J. Fendler Lankford Fendler + Associates License No. PE-2006037230 The following Sections: Divisions 21, 22, 23, and 26
HVAC ENGINEER	Gregory J. Fendler Lankford Fendler + Associates License No. PE-2006037230 The following Sections: Divisions 21, 22, 23, and 26
ELECTRICAL ENGINEER	Gregory J. Fendler Lankford Fendler + Associates License No. PE-2006037230 The following Sections: Divisions 21, 22, 23, and 26

END OF DOCUMENT 00 01 07

GEOTECHNICAL EXPLORATION
HIGH TECHNOLOGY BUILDING ADDITION
METROPOLITAN COMMUNITY COLLEGE
LEE'S SUMMIT, MISSOURI

Prepared for:

METROPOLITAN COMMUNITY COLLEGE
C/O BNIM ARCHITECTS
KANSAS CITY, MISSOURI

Prepared by:

GEOTECHNOLOGY, LLC
OVERLAND PARK, KANSAS

Date:

JULY 19, 2021

Geotechnology Project No.:

J039128.01

SAFETY
QUALITY
INTEGRITY
PARTNERSHIP
OPPORTUNITY
RESPONSIVENESS

July 19, 2021

Metropolitan Community College
c/o Mr. Jeremy Kahm, AIA, LEED AP BD + C
bnim Architects
2460 Pershing Road
Kansas City, Missouri 64108

Re: Geotechnical Exploration
High Technology Building Addition
Metropolitan Community College
Lee's Summit, Missouri
Geotechnology Project No. J039128.01

Dear Mr. Kahm:

Presented in this report are the results of the geotechnical exploration conducted for the referenced project. This report includes our project understanding, observed site conditions, conclusions and/or recommendations, and support data as given in the Table of Contents.

It has been our pleasure to provide geotechnical services to you, and we would welcome the opportunity to provide other services during the course of the project. Please contact the undersigned if you need further information about this document.

Respectfully submitted,

GEOTECHNOLOGY, INC.

Sheryl D. Gallagher, P.E.
Principal Engineer

SDG/FC:sdg/ljd

GEOTECHNOLOGY

TABLE OF CONTENTS

FIGURES

APPENDICES

GEOTECHNOLOGY

GEOTECHNICAL EXPLORATION
HIGH TECHNOLOGY BUILDING ADDITION
METROPOLITAN COMMUNITY COLLEGE
LEE'S SUMMIT, MISSOURI

July 19, 2021 | Geotechnology Project No. J039128.01

1.0 EXECUTIVE SUMMARY

The executive summary is provided solely for the purposes of overview, and a number of details are omitted, any one of which could be crucial to the proper application of this report.

- The project consists of a single-story, slab-on-grade, 2,500 square foot addition to the high technology building.
- The existing building is supported on drilled shafts bearing at a depth of approximately 12 feet.
- The stratigraphy generally consists of asphalt pavement underlain by stiff to very stiff, fat clay underlain by very stiff lean clay. The clays are underlain by sampler and auger refusal material. Perched groundwater occurs at a depth of 1 foot at two of the borings.
- Fat clay below floor slabs must be remediated as discussed herein.
- The building may be supported on shallow foundations; however, undercutting and replacement of the fat clays should occur beneath foundations. Alternately, the building addition may be supported on deep foundations such as helical anchors.
- Based on the results of the borings, and the general procedures of the 2018 Edition of the International Building Code (IBC), the soil profile at the project site may be defined as Site Class C (Very Dense Soil and Soft Rock).

2.0 PROJECT DATA

2.1 Authorization

The services documented in this report were provided in general accordance with the scope of services described in Geotechnology's proposal P039128.01 dated June 18, 2021. The project was authorized by a representative of Metropolitan Community College (MCC).

2.2 Purpose and Scope of Services

The purpose of our services was to develop recommendations for geotechnical aspects of the design and construction of the building addition as defined in the scope of services of the referenced proposal. Briefly, geotechnical services consisted of drilling four borings, laboratory testing, engineering analyses and preparation of this report.

2.3 Project Description and Site Location

The project includes a building addition to the southwest corner of the existing high technology building at the MCC Longview Campus in Lee's Summit, Missouri. The 2,500 square foot addition will be a story-story slab-on-grade metal shell building. We understand column and wall loads of up to 15 kips and 1 kip per lineal foot, respectively, are anticipated. We further understand final grade will be within 1 foot of existing grade. The site location and general topography of the area as per the 2017 U.S.G.S. map of the vicinity are shown on Figure 1.

We understand that the existing building is supported on drilled piers bearing at a depth of 12 feet. Further information regarding the existing building foundation system or bearing material was not available. Plans include potentially supporting the addition on helical piers. The area of the planned addition is currently paved with asphalt.

3.0 FIELD EXPLORATION AND LABORATORY TESTING

3.1 Field Exploration

The field exploration consisted of drilling four borings, designated as Borings B-1 through -4, at approximately the locations shown on Figure 2. An engineer from Geotechnology located the borings in the field by measuring distances from site features. The elevations at the boring locations were estimated from Google Earth and are approximate. A registered land surveyor should measure the boring locations if more accurate measurements are required.

The borings were drilled using an all-terrain Diedrich D-50 rotary drill rig equipped with 4-inch diameter flight augers. Standard Penetration Tests (SPTs) were performed using an automatic hammer. Split-spoon and Shelby tube samples were obtained at the depths indicated on the boring logs presented in Appendix B. An explanation of the terms and symbols used on the boring logs is also included in Appendix B.

An engineer from Geotechnology provided direction during field exploration, observed drilling and sampling, and prepared logs of the material encountered. The boring logs represent conditions observed at the time of exploration and have been edited by a professional engineer to incorporate results of the laboratory tests.

Unless noted on the boring logs, the lines designating the changes between various strata represent approximate boundaries. The transition between materials might be gradual or might occur between recovered samples. The stratification given on the boring logs, or described herein, is for use by Geotechnology in its analyses and should not be used as the basis of design or construction cost estimates without realizing that there can be variation from that shown or described.

The boring logs and related information depict subsurface conditions only at the specific locations and time where sampling was conducted. The passage of time might result in changes in conditions, interpreted to exist, at or between the locations where sampling was conducted.

3.2 Laboratory Testing

Laboratory testing was performed on the soil samples to estimate engineering and index properties. Moisture content tests were performed on each sample. An Atterberg limits test was performed on a selected fine-grained soil sample. Dry unit weight determinations and unconfined compressive strength tests were performed on the Shelby tube samples. Results of the laboratory tests are presented on the boring logs.

4.0 SUBSURFACE CONDITIONS

4.1 Stratigraphy

Below the approximately 4 to 5 inches of asphalt, the stratigraphy generally consists of stiff to very stiff, fat clay to a depth of approximately 12 feet. The fat clay was underlain by very stiff, lean shaley clay to sampler and auger refusal between 14 and 15 feet. Since rock coring was not performed the nature of the refusal material was not determined. Auger refusal could represent a boulder, rock ledge or competent rock.

4.2 Groundwater

At Borings B-2 and -4, groundwater was noted at a depth of 1 foot during drilling. The water levels in Borings B-2 and -4 may be perched on fat clay. The other two borings were dry during drilling. Groundwater levels might not have stabilized, particularly in less permeable fine-grained soil, prior to backfilling. Consequently, the presence or lack of groundwater levels might not represent present or future levels. Groundwater levels might vary substantially over time due to the effects of seasonal variation in precipitation, recharge or other factors not evident at the time of exploration. Therefore, groundwater levels during construction or at other times in the life of the structure might be higher than the levels indicated on the boring logs. Excavations that remain open could collect water.

5.0 DESIGN CONSIDERATIONS AND RECOMMENDATIONS

Geotechnology should be allowed to review final grading and foundation plans to check that our recommendations have been properly implemented. If the structure loads, elevations or locations vary from those discussed, the recommendations herein might require modifications, and/or additional field exploration and related analysis might be required. Subsurface features that will influence the geotechnical approach to the proposed addition include the presence of fat clay and perched groundwater. Discussions of each of these features follows.

Fat Clay. Fat clay was encountered in the borings. These materials have the potential for volume change due to fluctuations in moisture content throughout the life of the structure. Swelling and consequent heaving of floors and lightly loaded foundations can occur when a fat clay subgrade absorbs moisture. Alternatively, shrinkage and consequent loss of subgrade support can occur when a fat clay subgrade desiccates. Remediation of fat clay occurring within the upper portion of floor slab and foundation subgrades is required, and criteria are given herein.

Apparent Groundwater. Groundwater was encountered at a depth of 1 foot in the borings located near the building. It is our professional opinion that the groundwater is a perched condition which could be influenced by roof runoff and poor drainage of the underlying fat clay. Surface drainage should be controlled to prevent flow of surface water into excavations. Seepage forces might increase risk of instability of excavations. It is anticipated that perched groundwater into excavations can be controlled by use of sumps and pumps. If sumps cannot control the groundwater seepage, Geotechnology should be contacted to review the method of dewatering proposed by the contractor.

5.1 Site Grading

Site Preparation. In general, the site should be stripped of pavement, soft soil, and other deleterious materials. Proofrolling with a tandem axle dump truck loaded to approximately 20,000 pounds per axle (or equivalent proofrolling equipment) can be considered as a means of evaluating the subgrade. Soft areas that develop and areas that exhibit deflection should be overexcavated and backfilled with soil fill or well-graded crushed limestone compacted to the density listed in the compaction summary.

Remediation of Fat Clay. Fat clay should be remediated to a depth of at least 2 feet below floor slab and footing subgrades. If the floor slab section includes crushed rock, the remediation depth is considered below the crushed rock.

The overexcavations for floor slabs may be backfilled with low plasticity soil (liquid limit less than 45 percent) or well-graded crushed limestone with a 2-inch maximum particle size. Chemical remediation of fat clay using lime or fly ash is not advised due to the urban nature of the project and the potential for these caustic materials to become airborne. Additionally, the potential for excess soils where overexcavation is required should be considered in final grading plans if a balanced site is required. The overexcavations for foundations should be backfilled with concrete.

The method of treatment previously suggested is based on generally accepted standards in the local engineering community. Clay properties, including plasticity, moisture content, density, swell pressure, and mineralogy are extremely variable and could, in some instances, be conducive to more severe swell pressures and volume change potential than can be mitigated by nominal treatment. Consequently, when building in an area where fat clay is present, the owner should recognize that there is an inherent risk that damage associated with shrink or swell of the soil could occur, even with remedial treatment of subgrade soil.

Suitable Fill Materials. On-site materials generated from excavations are expected to include fat clay and asphalt pavement. Fat clay may be used for fill provided the material is moisture conditioned and free of deleterious materials; however, fat clay should not be used within 2 feet of floor slab subgrades. The asphalt pavement should be hauled off the site and properly disposed. Imported fill should consist of lean clay (liquid limit value of 45 percent or less) and well-graded crushed limestone with a 2-inch maximum particle size. Limestone screenings are susceptible to changes in moisture content and are not advised in pavement areas.

Fill and Backfill Placement. Fill or backfill should be placed in uniform lifts and compacted. The loose lift thickness should not exceed 8 inches. The fill should be systematically compacted to the level given in the compaction summary. The soil should be placed at moisture contents compatible with the required unit weight. Depending on the soil moisture at the time of construction, drying or wetting might be required to achieve compaction. Deleterious material should not be included in fill, and the fill should not be placed on soft materials or frozen ground.

Compaction Summary

Category	Minimum Compaction[a]
Fine-Grained Soil	95%[b]
Crushed Limestone	95%

[a] Measured as a percent of the maximum unit weight as determined by the standard Proctor test (ASTM D 698).

[b] Moisture content within zero to plus 4 percent of the optimum moisture content

Trench Backfill. Settlement of trench backfill can result in unsightly depressions and localized slab failures. The magnitude of settlement can be substantially reduced by mechanical compaction of the trench backfill. In floor slab and pavement areas, well-graded crushed rock compacted to the minimum level specified in the Compaction Summary should be used as trench backfill. Poorly-graded (clean) rock must not be used for trench backfill. Clean rock can collect water which can soften the underlying fine-grained soils, or lead to the migration of fines and loss of subgrade support, or in the presence of fat clay, could lead to heaving.

Subgrade Protection. Drainage of the construction areas should be provided to protect foundation and floor slab subgrades from the detrimental effects of weather during construction. Finished subgrades and foundation excavations should be kept free of standing water. Concrete should be placed in foundation excavations the same day they are completed. Subgrades will be exposed to weather and disturbances from the installation of utilities and normal construction traffic. Disturbance is relatively easy to repair in drier months by reworking of the upper soils. During wetter periods of the year, such as spring and winter, considerable difficulty can be experienced. Construction traffic should be routed away from prepared subgrades.

Collection and Disposal of Site Water. Managing site water is important in the successful performance of foundations. Water from surface runoff, downspouts and subsurface drains should be collected and discharged through a site drainage system.

Control of surface runoff should be maintained in compliance with the rules and regulations set forth in the Federal Water Pollution Control Act. Additionally, permits related to site grading activities and control of stormwater during construction activities should be obtained from the applicable governmental jurisdiction(s).

5.2 Shallow Foundations

Allowable Bearing Pressure. Foundation subgrades should be undercut and backfilled with concrete as previously discussed. Strip and spread footings may be proportioned for net allowable bearing pressures of 2,000 and 2,500 psf, provided the footings are bearing on 2 feet of concrete. Footing bearing pressures should be maximized to the extent possible due to the presence of fat clay at the site.

The minimum lateral dimensions for strip and spread footings should be 18 and 24 inches, respectively. As a measure to provide protection from seasonal moisture variations and frost penetration, exterior footings and footings in unheated interior areas should bear at least 36 inches below grade.

Construction Considerations. If soft soil is encountered at the undercut footing subgrade elevations, footing excavations should be extended through these materials to firm, native soil and the overexcavation backfilled with concrete.

Settlement. Footings, proportioned and constructed as recommended herein, could settle approximately 1 inch. Differential settlement between footings could be approximately 3/4 inch. Estimated values of settlement contained in this report are based on our experience with projects of a similar nature.

Lateral Resistance. Lateral loads may be resisted by available frictional resistance between the base of the footing and the bearing material. Resistance to sliding can be computed assuming an ultimate coefficient of friction of 0.7; however, the maximum resistance should be limited to 500 psf. Ultimate passive resistance, if required, can be computed assuming an equivalent fluid pressure of 320 pounds per cubic foot. Safety factors should be applied to determine the allowable sliding and passive resistances. Passive resistance in the top 36 inches of soil should be neglected due to seasonal variations in moisture and frost penetration.

Uplift Resistance. Uplift loads can be resisted with the dead weight of the footings and the structure, and frictional resistance between the sides of the footings and the soil. An allowable resistance of 350 psf can be used for frictional resistance between the sides of the footings and the soil, provided the footings are earth-formed or compacted backfill is placed around them. Frictional resistance in the top 36 inches of soil should be neglected due to seasonal variations in moisture and frost penetration.

Excavations Next to Existing Footings. Care will be required when excavating adjacent to the existing building to avoid undermining the existing structure. We understand that new footings that will be adjacent to the existing building will bear on the drilled piers. Connections between the new and existing structures should be designed to allow for the anticipated differential movement.

5.3 Helical Piers

As an alternate to undercutting the fat clay below footings and replacement with concrete, helical piers bearing within the very stiff clays or on refusal material may be used to support the building. Helical piers consist of a shaft fabricated from either a solid square steel bar or tubular steel. Welded to the shaft are one or more helical plates. The plates can vary in diameter from 6 inches to up to 14 inches and thicknesses of 3/8 inch to 1/2 inch, depending upon the soil and application. These systems are proprietary, and a designer experienced in such a method should be consulted. Based on our experience with these systems, helical piers can generally support loads of 25 to 75 kips per element while limiting settlement to 1 inch or less.

5.4 Temporary Excavations

Temporary excavation slopes should be consistent with safety regulations. Worker safety and classification of soil type is the responsibility of the contractor. The materials encountered during excavations for the proposed project are anticipated to consist of natural, stiff to very stiff, fine-grained soil. The natural fine-grained soil can generally be classified as OSHA Type B soil. Temporary slopes in Type B soils may be constructed at 1V:1H or flatter in accordance with OSHA guidelines.

The contractor should be aware that excavation depths and inclinations (including adjacent existing slopes) should not exceed those specified in local, state or federal safety regulations, e.g., OSHA Health and Safety Standards for Excavations, 29 CFR, or successor regulations. Such regulations are strictly enforced and, if not followed, the contractor, or earthwork or utility subcontractors could be subjected to substantial penalties. Construction site safety is the sole responsibility of the contractor, who shall also be solely responsible for the means, methods and sequencing of construction operations.

Temporary slopes left open might undergo sloughing and result in an unstable situation. The contractor should evaluate stability and failure consequences before open cut slopes are made. Minor sloughing of open face slopes might occur. If the slope is expected to remain open for an extended time, an impermeable membrane covering the slope could be considered as a means to reduce the potential for slope degradation and instability.

It is important to note that soils encountered in the construction excavations might vary across the sites, and that even if the OSHA criteria are used, there is a potential for slope failure. If different subsurface conditions are encountered at the time of construction, we recommend that Geotechnology be contacted to evaluate the conditions.

5.5 Floor Slabs

Fat clay must be remediated as previously discussed. Floor slabs can be designed using a vertical subgrade modulus of 100 pounds per cubic inch (pci). Floor slabs should be underlain by a 4- to 6-inch layer of compacted well-graded crushed rock. A 15-mil or thicker plastic vapor barrier can be placed below the floor in interior finished areas to reduce the potential for moisture permeation through the slab and for mold growth within the building. Floor slabs should be structurally separated from walls, columns, footings and penetrations to allow independent movement of the floor. Alternatively, floor slabs that are not structurally

independent should be designed to allow for differential movements that normally occur between the floor slabs, columns and foundation walls.

5.6 Seismicity

Per the general procedures of Section 1613.1 of the 2018 edition of the IBC, the soil profile at the project site can be defined as Site Class C (Very Dense Soil and Soft Rock). Based on the computer program *U.S. Seismic Design Maps Web Application* prepared by the United States Geological Survey (USGS), the mapped maximum considered earthquake spectral response acceleration is approximately 9.9 percent gravity (0.099 g) at short periods (S_S) and 6.8 percent gravity (0.068 g) at 1-second periods (S_1).

6.0 RECOMMENDED ADDITIONAL SERVICES

The conclusions and recommendations given in this report are based on: Geotechnology's understanding of the proposed design and construction, as outlined in this report, site observations, interpretation of the exploration data, and our experience. Since the intent of the design recommendations is best understood by Geotechnology, we recommend that Geotechnology be included in the final design and construction process, and be retained to review the project plans and specifications to confirm that the recommendations given in this report have been correctly implemented. We recommend that Geotechnology be retained to participate in prebid and preconstruction conferences to reduce the risk of misinterpretation of the conclusions and recommendations in this report relative to the proposed construction of the subject project.

Since actual subsurface conditions between boring locations may vary from those encountered in the borings, our design recommendations are subject to adjustment in the field based on the subsurface conditions encountered during construction. Therefore, we recommend that Geotechnology be retained to provide construction observation services as a continuation of the design process to confirm the recommendations in this report and to revise them accordingly to accommodate differing subsurface conditions. Construction observation is intended to enhance compliance with project plans and specifications. It is not insurance, nor does it constitute a warranty or guarantee of any type. Regardless of construction observation, contractors, suppliers, and others are solely responsible for the quality of their work and for adhering to plans and specifications.

7.0 LIMITATIONS OF REPORT

This report has been prepared on behalf of, and for the exclusive use of the client for specific application to the named project as described herein. If this report is provided to other parties, it should be provided in its entirety with all supplementary information. In addition, the client should make it clear that the information is provided for factual data only, and not as a warranty of subsurface conditions presented in this report.

Geotechnology has attempted to conduct the services reported herein in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality and under similar conditions. The recommendations and

conclusions contained in this report are professional opinions. The report is not a bidding document and should not be used for that purpose.

Our scope of service for this phase of the project did not include any environmental assessment or investigation for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below or around this site. Any statements in this report or on the boring logs regarding odors noted or unusual or suspicious items or conditions observed are strictly for the information of our client. Our scope of service did not include an assessment of the effects of flooding and erosion of creeks or rivers adjacent to or on the project site.

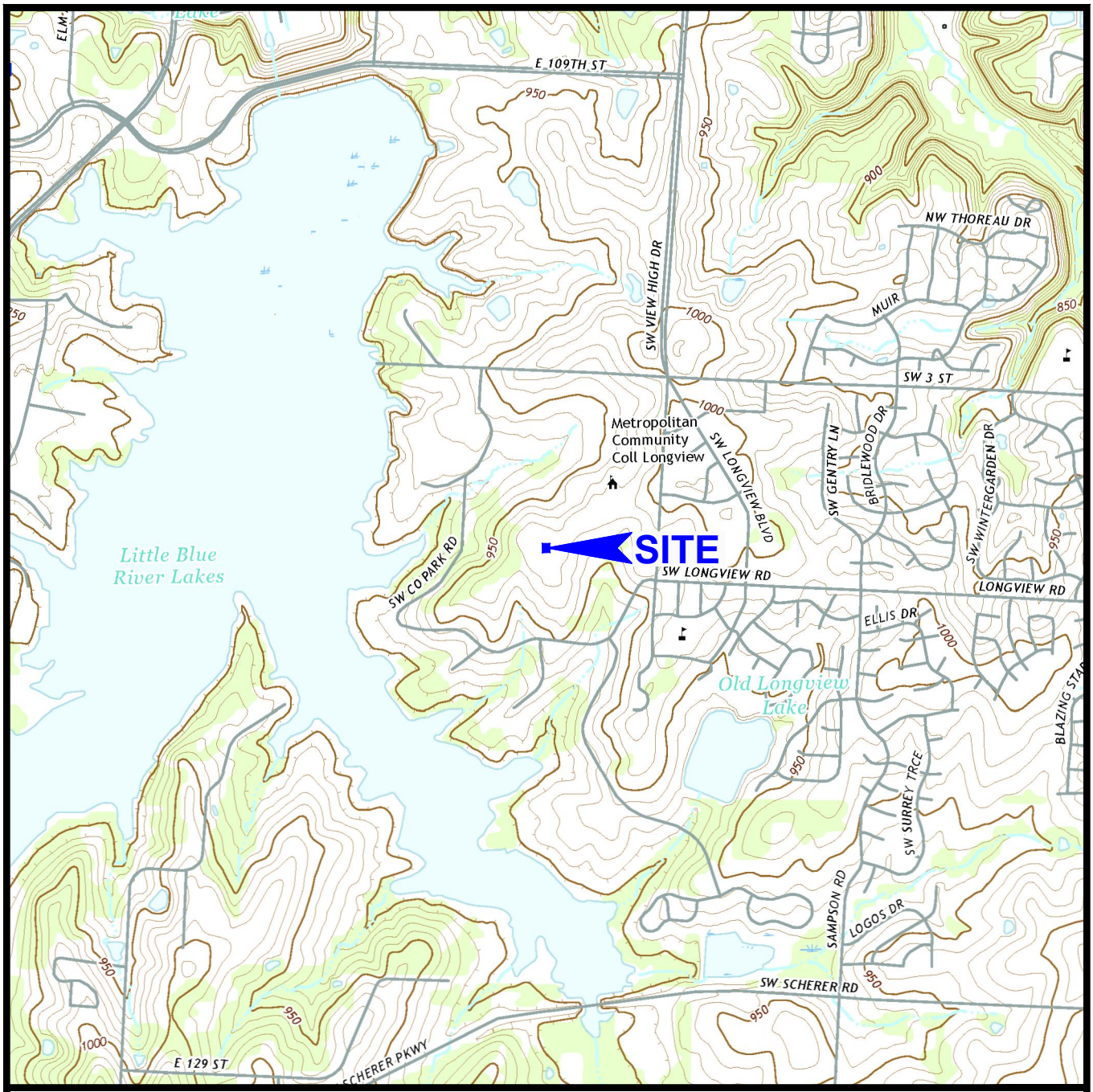
Our scope did not include: any services to investigate or detect the presence of mold or any other biological contaminants (such as spores, fungus, bacteria, viruses, and the by-products of such organisms) on and around the site; or any services, designed or intended, to prevent or lower the risk of the occurrence of an infestation of mold or other biological contaminants.

The analyses, conclusions, and recommendations contained in this report are based on the data obtained from the subsurface exploration. The field exploration methods used indicate subsurface conditions only at the specific locations where samples were obtained, only at the time they were obtained, and only to the depths penetrated. Consequently, subsurface conditions may vary gradually, abruptly, and/or nonlinearly between sample locations and/or intervals.

The conclusions or recommendations presented in this report should not be used without Geotechnology's review and assessment if the nature, design, or location of the facilities is changed, if there is a substantial lapse in time between the submittal of this report and the start of work at the site, or if there is a substantial interruption or delay during work at the site. If changes are contemplated or delays occur, Geotechnology must be allowed to review them to assess their impact on the findings, conclusions, and/or design recommendations given in this report. Geotechnology will not be responsible for any claims, damages, or liability associated with any other party's interpretations of the subsurface data or with reuse of the subsurface data or engineering analyses in this report.

The recommendations included in this report have been based in part on assumptions about variations in site stratigraphy that may be evaluated further during earthwork and foundation construction. Geotechnology should be retained to perform construction observation and continue its geotechnical engineering service using observational methods. Geotechnology cannot assume liability for the adequacy of its recommendations when they are used in the field without Geotechnology being retained to observe construction.

A copy of "Important Information about This Geotechnical-Engineering Report" that is published by the Geotechnical Business Council (GBC) of the Geoprofessional Business Association (GBA) is included in Appendix A for your review. The publication discusses some other limitations, as well as ways to manage risk associated with subsurface conditions.



NOTES

1. Plan adapted from a 7.5 minute U.S.G.S. map Lees Summit, Missouri quadrangle, last revised in 2017.

0 2,000 4,000

SCALE IN FEET

N

Drawn By: WAH	Ck'd By: SDG	App'vd By: FC
Date: 6-1-21	Date: 7-15-21	Date: 7-19-21

GEOTECHNOLOGY INC
FROM THE GROUND UP

High Technology Addition
MCC - Longview
Lee's Summit, Missouri

SITE LOCATION AND TOPOGRAPHY

Project Number
J039128.01

FIGURE 1

NOTES

1. Plan adapted from a February 20, 2020 aerial photograph courtesy of Google Earth and a drawing dated June 7, 2021, titled "Site Plan", prepared by bnim Architects.

2. Borings were located in the field with reference to site features and are shown approximate only.

LEGEND

● Boring Location

0 50 100

SCALE IN FEET

N

Drawn By: WAH	Ck'd By: SDG	App'vd By: FC
Date: 6-24-21	Date: 7-15-21	Date: 7-19-21

GEOTECHNOLOGY INC
FROM THE GROUND UP

High Technology Addition
MCC - Longview
Lee's Summit, Missouri

AERIAL PHOTOGRAPH OF SITE AND BORING LOCATIONS

Project Number
J039128.01

FIGURE 2

APPENDIX A

Important Information about This Geotechnical-Engineering Report

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical-engineering study conducted for a civil engineer may not fulfill the needs of a constructor — a construction contractor — or even another civil engineer. Because each geotechnical- engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client. No one except you should rely on this geotechnical-engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply this report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical-engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

Geotechnical Engineers Base Each Report on a Unique Set of Project-Specific Factors

Geotechnical engineers consider many unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk-management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical-engineering report that was:

- not prepared for you;
- not prepared for your project;
- not prepared for the specific site explored; or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical-engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light-industrial plant to a refrigerated warehouse;
- the elevation, configuration, location, orientation, or weight of the proposed structure;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical-engineering report is based on conditions that existed at the time the geotechnical engineer performed the study. *Do not rely on a geotechnical-engineering report whose adequacy may have been affected by*: the passage of time; man-made events, such as construction on or adjacent to the site; or natural events, such as floods, droughts, earthquakes, or groundwater fluctuations. *Contact the geotechnical engineer before applying this report to determine if it is still reliable.* A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ — sometimes significantly — from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide geotechnical-construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are Not Final

Do not overrely on the confirmation-dependent recommendations included in your report. *Confirmation-dependent recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations *only* by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's confirmation-dependent recommendations if that engineer does not perform the geotechnical-construction observation required to confirm the recommendations' applicability.*

A Geotechnical-Engineering Report Is Subject to Misinterpretation

Other design-team members' misinterpretation of geotechnical-engineering reports has resulted in costly

problems. Confront that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Constructors can also misinterpret a geotechnical-engineering report. Confront that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing geotechnical construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical-engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make constructors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give constructors the complete geotechnical-engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise constructors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure constructors have sufficient time* to perform additional study. Only then might you be in a position to give constructors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and constructors fail to recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Environmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform an *environmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical-engineering report does not usually relate any environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own environmental information, ask your geotechnical consultant for risk-management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold-prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, many mold- prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical- engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; *none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.*

Rely, on Your GBC-Member Geotechnical Engineer for Additional Assistance

Membership in the Geotechnical Business Council of the Geoprofessional Business Association exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project. Confer with you GBC-Member geotechnical engineer for more information.

GEOTECHNICAL BUSINESS COUNCIL
of the Geoprofessional Business Association

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@geoprofessional.org www.geoprofessional.org

APPENDIX B

Logs of Borings B-1 through -4
Boring Log: Terms and Symbols

Surface Elevation 991 | Completion Date: 6/25/21

Datum WGS84

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GRAPHIC LOG	DRY UNIT WEIGHT (pcf) SPT BLOW COUNTS CORE RECOVERY/RQD	SAMPLES
	ASPHALT - 4.5 inches			
	CLAY - brown grading to red-brown, stiff to very stiff, fat - CH		3-4-7	SS1
			3-4-6	SS2
5			90	ST3
			3-6-8	SS4
10				
	CLAY - green-gray, very stiff, lean, shaley - CL		9-50/3"	SS5
15	Boring terminated at 14.3 feet at auger refusal			
20				
25				
30				
35				

SHEAR STRENGTH, tsf

△ - UU/2 ○ - QU/2 □ - PP/2

0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE

(ASTM D 1586)

▲ N-VALUE (BLOWS PER FOOT)

WATER CONTENT, %

PL 10 20 30 40 50 LL

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL. GRAPHIC LOG FOR ILLUSTRATION PURPOSES ONLY.

GROUNDWATER DATA

X FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

4" AUGER ___ HOLLOW STEM

WASHBORING FROM ___ FEET

RRM DRILLER ALY LOGGER

Diedrich D-50 DRILL RIG

HAMMER TYPE Auto

REMARKS:

Drawn by: SDG	Check by: SDG	App'vd by: FC
Date: 6/25/21	Date: 7/15/21	Date: 7/19/21

GEOTECHNOLOGY

High Technology Building Addition
Metropolitan Community College
Lee's Summit, Missouri

LOG OF BORING: B-1

Project No. J039128.01

Surface Elevation 992 | Completion Date: 6/25/21

Datum WGS84

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GRAPHIC LOG	DRY UNIT WEIGHT (pcf) SPT BLOW COUNTS CORE RECOVERY/RQD	SAMPLES
0	ASPHALT - 4 inches			
	CLAY - gray-brown grading to red-brown, stiff to very stiff, fat - CH		2-4-5	SS1
			108	ST2
5			3-4-5	SS3
			4-6-4	SS4
10				
	CLAY - green-gray, very stiff, lean, shaley - CL		7-50/5.5"	SS5
15	Boring terminated at auger refusal at 14.5 feet			
20				
25				
30				
35				

SHEAR STRENGTH, tsf

△ - UU/2 ○ - QU/2 □ - PP/2

0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE

(ASTM D 1586)

▲ N-VALUE (BLOWS PER FOOT)

WATER CONTENT, %

PL 10 20 30 40 50 LL

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL. GRAPHIC LOG FOR ILLUSTRATION PURPOSES ONLY.

GROUNDWATER DATA

ENCOUNTERED AT 1 FEET ▽

DRILLING DATA

4" AUGER ___ HOLLOW STEM

WASHBORING FROM ___ FEET

RRM DRILLER ALY LOGGER

Diedrich D-50 DRILL RIG

HAMMER TYPE Auto

REMARKS:

Drawn by: SDG	Check by: SDG	App'vd by: FC
Date: 6/25/21	Date: 7/15/21	Date: 7/19/21

GEOTECHNOLOGY

High Technology Building Addition
Metropolitan Community College
Lee's Summit, Missouri

LOG OF BORING: B-2

Project No. J039128.01

Surface Elevation 991 | Completion Date: 6/25/21

Datum WGS84

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GRAPHIC LOG	DRY UNIT WEIGHT (pcf) SPT BLOW COUNTS CORE RECOVERY/RQD	SAMPLES
	ASPHALT - 4.5 inches			
	CLAY - brown grading to red-brown and gray, stiff to very stiff, fat - CH		3-4-6	SS1
			98	ST2
5			3-4-6	SS3
			3-4-6	SS4
10				
	CLAY - green-gray, very stiff, lean, shaley - CL		7-50/4"	SS5
15	Boring terminated at auger refusal at 14.3 feet			
20				
25				
30				
35				

SHEAR STRENGTH, tsf

△ - UU/2 ○ - QU/2 □ - PP/2

0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE

(ASTM D 1586)

▲ N-VALUE (BLOWS PER FOOT)

WATER CONTENT, %

PL 10 20 30 40 50 LL

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL. GRAPHIC LOG FOR ILLUSTRATION PURPOSES ONLY.

GROUNDWATER DATA

X FREE WATER NOT ENCOUNTERED DURING DRILLING

DRILLING DATA

4" AUGER ___ HOLLOW STEM

WASHBORING FROM ___ FEET

RRM DRILLER ALY LOGGER

Diedrich D-50 DRILL RIG

HAMMER TYPE Auto

REMARKS:

Drawn by: SDG	Check by: SDG	App'vd by: FC
Date: 6/25/21	Date: 7/15/21	Date: 7/19/21

GEOTECHNOLOGY

High Technology Building Addition
Metropolitan Community College
Lee's Summit, Missouri

LOG OF BORING: B-3

Project No. J039128.01

Surface Elevation 992 | Completion Date: 6/25/21

Datum WGS84

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GRAPHIC LOG	DRY UNIT WEIGHT (pcf) SPT BLOW COUNTS CORE RECOVERY/RQD	SAMPLES
	ASPHALT - 5 inches			
	CLAY - gray, stiff to very stiff, fat - (CH)		2-4-6	SS1
			3-7-9	SS2
5	red-brown		94	ST3
			3-5-7	SS4
10				
	CLAY - green-gray, very stiff, lean, shaley - CL		7-50/5"	SS5
15	Boring terminated at auger refusal at 14.4 feet			
20				
25				
30				
35				

SHEAR STRENGTH, tsf

△ - UU/2 ○ - QU/2 □ - PP/2

0.5 1.0 1.5 2.0 2.5

STANDARD PENETRATION RESISTANCE

(ASTM D 1586)

▲ N-VALUE (BLOWS PER FOOT)

WATER CONTENT, %

PL 10 20 30 40 50 LL

70 >>

NOTE: STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARIES BETWEEN SOIL TYPES AND THE TRANSITION MAY BE GRADUAL. GRAPHIC LOG FOR ILLUSTRATION PURPOSES ONLY.

GROUNDWATER DATA

ENCOUNTERED AT 1 FEET ▽

DRILLING DATA

4" AUGER ___ HOLLOW STEM

WASHBORING FROM ___ FEET

RRM DRILLER ALY LOGGER

Diedrich D-50 DRILL RIG

HAMMER TYPE Auto

REMARKS:

Drawn by: SDG	Check by: SDG	App'vd by: FC
Date: 6/25/21	Date: 7/15/21	Date: 7/19/21

GEOTECHNOLOGY

High Technology Building Addition
Metropolitan Community College
Lee's Summit, Missouri

LOG OF BORING: B-4

Project No. J039128.01

BORING LOG: TERMS AND SYMBOLS

GENERAL NOTES

1. *Information on each boring log is a compilation of subsurface conditions based on soil or rock classifications obtained from the field as well as from laboratory testing of samples. The strata lines on the logs may be approximate or the transition between the strata may be gradual rather than distinct. Water level measurements refer only to those observed at the times and places indicated, and may vary with time, geologic condition or construction activity.*
2. *Relative composition and Unified Soil Classification designations are based on visual estimates and are approximate only. If laboratory tests were performed to classify the soil, the unified designation is show in parenthesis.*
3. *Value given in Unit Dry Weight/SPT Column is either a unit dry weight in pounds per cubic foot, if adjacent to a ST sample designation, or blows per 6-inch increment if adjacent to a SS sample designation.*

ABBREVIATIONS

UU/2	*Shear Strength from Unconsolidated – Undrained Triaxial Test (ASTM D2850)*
QU/2	*Shear Strength from Unconfined Compression Test (ASTM D2166)*
SV	*Shear Strength from Field Vane (ASTM D2573)*
PL	*Plastic Limit (ASTM D4318)*
LL	*Liquid Limit (ASTM D4318)*

LEGEND

CS	Continuous Sampler
GB	Grab Sample Taken From Auger Cuttings or Wash Water Return
NX 100/42	NX Rock Core with Percent Recovery/R.Q.D. Given In Adjacent Column
PST	Three Inch Diameter Piston Tube Sample
SS	Split Spoon Sample (Standard Penetration Test)
ST	Three Inch Diameter Shelby Tube Sample
*	Sample Not Recovered
SV	Field Vane Test

SPLIT – BARREL SAMPLER DRIVING RECORD

Blow per Foot (N-Value)	*Description*
25	*25 blows drove sampler 12 inches after initial 6 inches of seating.*
75/10”	*75 blows drove sampler 10 inches after initial 6 inches of seating.*
50/S3”	*50 blows drove sampler 3 inches during initial 6 inch seating interval.*

NOTES: 1. *To avoid damage to sampling tools, driving is limited to 50 blows during any six inch interval.*
2. *N-Value (Blow Count) is the standard penetration resistance based on the total number of blows, using a 140-lb hammer with 30-inch free fall, required to drive a split spoon the last two of three, 6-inch drive increments. (Example: 4/7/9, N = 7 + 9 = 16). Values are shown as a summation on grid plot and may be shown as 4/7/9 in Unit Dry Weight – SPT column.*

RELATIVE COMPOSITION

Trace……...0-10 %
With/Some……...11-35 %
Soil modifier such…... > 35 %
As silty, clayey, sandy, etc.

DENSITY OF GRANULAR SOILS

Descriptive Term:	***N—Value***
Very Loose	*0 - 4*
Loose	*5 - 10*
Medium Dense	*11 - 30*
Dense	*31 - 50*
Very Dense	*> 50*

STRENGTH OF COHESIVE SOILS

Consistency	***Undrained Shear Strength Tons Per Sq. Ft.***	***Field Test***	***Approximate N-Value Range***
Very Soft	*less than 0.12*	*Thumb will penetrate soil more than 1”*	*0 - 1*
Soft	*0.13 to 0.25*	*Thumb will penetrate soil about 1”*	*2 - 4*
Medium Stiff	*0.26 to 0.50*	*Thumb will penetrate soil about ¼”*	*5 – 8*
Stiff	*0.51 to 1.00*	*Thumb hardly indents soil*	*9 – 15*
Very Stiff	*1.01 to 2.00*	*Thumb will not indent soil, but readily indented with thumbnail*	*16 – 30*
Hard	*greater than 2.00*	*Thumbnail will not indent soil*	*> 30*

SOIL GRAIN SIZE

U.S. STANDARD SIEVE

12”	3”	¾“	4	10	40	200		
BOULDERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		
300	76.2	19.1	4.76	2.00	0.42	0.074	0.002	

SOIL GRAIN SIZE IN MILLIMETERS

SOIL STRUCTURE

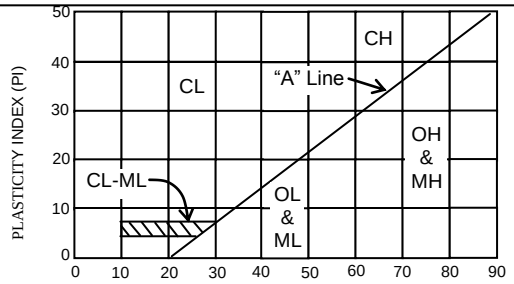
Calcareous *– Having appreciable quantities of carbonate.*
Fissured *– Containing shrinkage or relief cracks, often filled with sand or silt; usually more or less vertical.*
Slickensided *– Having planes of weakness that appear slick and glossy. The degree of slickensidedness depends upon the spacing of slickensides and the ease of breaking along those planes.*
Layer *-- Inclusion greater than 3 inches thick.*
Seam *– Inclusion 1/8 inch to 3 inches thick extending through the sample*
Parting *– Inclusion less than 1/8 inch thick.*
Pocket *– Inclusion of material of different texture that is smaller than the diameter of the sample.*
Interlayered *– Soil samples composed of alternating layers of different soil types.*
Intermixed *– Soil samples composed of pockets of different soil types and a layered or laminated structure is not evident.*
Laminated *– Soil sample composed of alternating partings or seams of different soil type.*

GEOTECHNOLOGY INC
FROM THE GROUND UP

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			SYMBOL	DESCRIPTION
Coarse-Grained Soils (More than 50% Larger than No 200 Sieve Size)	Gravel and Gravelly Soils	Clean Gravels Little or no Fines	GW	Well-Graded Gravel, Gravel-Sand Mixture
			GP	Poorly –Graded Gravel, Gravel-Sand Mixture
		Gravels with Appreciable Fines	GM	Silty Gravel, Gravel-Sand-Silt Mixture
			GC	Clayey-Gravel, Gravel-Sand-Clay Mixture
	Sand and Sandy Soils	Clean Sands Little or no Fines	SW	Well-Graded Sand, Gravelly Sand
			SP	Poorly Graded Sand, Gravelly Sand
		Sands with Appreciable Fines	SM	Silty Sand, Sand-Silt Mixture
			SC	Clayey Sand, Sand-Clay Mixture
Fine-Grained Soils (More than 50% Smaller than No 200 Sieve Size)	Silts and Clays	Liquid Limit Less Than 50	ML	Silt, Clayey Silt, Silty or Clayey Very Fine Sand, Slight Plasticity
			CL	Clay, Sandy Clay, Silty Clay, Low to Medium Plasticity
			OL	Organic Silts, or Silty Clays of Low Plasticity
	Silts and Clays	Liquid Limit More Than 50	MH	Silt, Fine Sandy or Silt Soil with High Plasticity
			CH	Clay, High Plasticity
			OH	Organic Clay of Medium to High Plasticity
	Highly Organic Soils		PT	Peat, Humus, Swamp Soil

PLASTICITY CHART



RELATIVE PLASTICITY

Nonplastic	Cannot Roll Into Ball
Trace Plasticity	Barely Roll Into Ball
Medium Plastic	Can be Rolled Into Ball
Highly Plastic	No Rupture by Kneading

VISUAL DESCRIPTION CRITERIA*

TABLE 1: CRITERIA FOR DESCRIBING ANGULARITY OF COARSE-GRAINED PARTICLES

Description	Criteria
Angular	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular	Particles are similar to angular description but have rounded edges
Subrounded	Particles have nearly plane sides but have well-rounded corners and edges
Rounded	Particles have smoothly curved sides and no edges

TABLE 2: CRITERIA FOR DESCRIBING PARTICLE SHAPE

Description	Criteria
Flat	Particles with width/thickness X3
Elongated	Particles with length/width X3
Flat and Elongated	Particles meet criteria for both flat and elongated

TABLE 3: CRITERIA FOR DESCRIBING MOISTURE CONDITION

Description	Criteria
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp, but no visible water
Wet	Visible free water, usually soil is below the water table

TABLE 4: CRITERIA FOR DESCRIBING REACTION WITH HCL

Description	Criteria
None	No visible reaction
Weak	Some reaction, with bubbles forming slowly
Strong	Violent reaction, with bubbles forming rapidly

TABLE 6: CRITERIA FOR DESCRIBING CEMENTATION

Description	Criteria
Weak	Crumbles or breaks with handling or little finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

*NOTES: 1. Tables adapted from ASTM D2488 "Description and identification of Soils" (Visual-Manual Procedure)
2. Tables 5, 7 and 11 incorporated into other information on this plate.

TABLE 8: CRITERIA FOR DESCRIBING DRY STRENGTH

Description	Criteria
None	The dry specimen crumbles into powder with mere pressure of handling
Low	The dry specimen crumbles into powder with some finger pressure
Medium	The dry specimen breaks into pieces or crumbles with considerable finger pressure
High	The dry specimen cannot be broken with finger pressure. Specimen will break into pieces between thumb and a hard surface.
Very High	The dry specimen cannot be broken between the thumb and a hard surface

TABLE 9: CRITERIA FOR DESCRIBING DILATANCY

Description	Criteria
None	No visible change in the specimen
Slow	Water appears slowly on the surface of the specimen during shaking and does not disappear or disappears slowly upon squeezing.
Rapid	Water appears quickly on the surface of the specimen during shaking and disappears quickly upon squeezing.

TABLE 10: CRITERIA FOR DESCRIBING TOUGHNESS

Description	Criteria
Low	Only slight pressure is required to roll the thread near the plastic limit. The thread and the lump are weak and soft.
Medium	Medium pressure is required to roll the thread to near the plastic limit. The thread and the lump have medium stiffness
High	Considerable pressure is required to roll the thread to near the plastic limit. The thread and the lump have very high stiffness

TABLE 12: IDENTIFICATION OF INORGANIC FINE-GRAINED SOILS FROM MANUAL TESTS

Soil Symbol	Dry Strength	Dilatancy	Toughness
ML	None to low	Slow to rapid	Low or thread cannot be formed
CL	Medium to high	None to slow	Medium
MH	Low to medium	None to slow	Low to medium
CH	High to very high	none	High

DRAFT

AIA® Document C106™ – 2013

Digital Data Licensing Agreement

AGREEMENT made as of the « » day of « » in the year « »
(In words, indicate day, month and year.)

BETWEEN the Party transmitting Digital Data ("Transmitting Party"):
(Name, address and contact information, including electronic addresses)

BNIM Architects
2460 Pershing Road
Suite 100
Kansas City, Missouri 64108

(816) 783-1500

www.bnim.com

and the Party receiving the Digital Data ("Receiving Party"):
(Name, address and contact information, including electronic addresses)

Receiving Party Company Name
Receiving Party Company Address

Receiving Party Phone

Receiving Party Web Address

for the following Project:
(Name and location or address)

MCC Longview HT Renovation/Addition
500 SW Longview Road
Lee's Summit, MO 64081

The Transmitting Party and Receiving Party agree as follows.

TABLE OF ARTICLES

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

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

DRAFT

ELECTRONIC COPYING of any portion of this AIA® Document to another electronic file is prohibited and constitutes a violation of copyright laws as set forth in the footer of this document.

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 The purpose of this Agreement is to grant a license from the Transmitting Party to the Receiving Party for the Receiving Party's use of Digital Data on the Project, and to set forth the license terms.

§ 1.2 This Agreement is the entire and integrated agreement between the parties. Except as specifically set forth herein, this Agreement does not create any other contractual relationship between the parties.

§ 1.3 For purposes of this Agreement, the term Digital Data is defined to include only those items identified in Article 5 below.

§ 1.3.1 Confidential Digital Data is defined as Digital Data containing confidential or business proprietary information that the Transmitting Party designates and clearly marks as "confidential."

ARTICLE 2 TRANSMISSION OF DIGITAL DATA

§ 2.1 The Transmitting Party grants to the Receiving Party a nonexclusive limited license to use the Digital Data identified in Article 5 solely and exclusively to perform services for, or construction of, the Project in accordance with the terms and conditions set forth in this Agreement.

.1 Intended use: *(Describe reason for request or use such as: Preparation of Shop Drawings, etc.)*

§ 2.2 The transmission of Digital Data constitutes a warranty by the Transmitting Party to the Receiving Party that the Transmitting Party is the copyright owner of the Digital Data, or otherwise has permission to transmit the Digital Data to the Receiving Party for its use on the Project in accordance with the terms and conditions of this Agreement.

§ 2.3 If the Transmitting Party transmits Confidential Digital Data, the transmission of such Confidential Digital Data constitutes a warranty to the Receiving Party that the Transmitting Party is authorized to transmit the Confidential Digital Data. If the Receiving Party receives Confidential Digital Data, the Receiving Party shall keep the Confidential Digital Data strictly confidential and shall not disclose it to any other person or entity except as set forth in Section 2.3.1.

§ 2.3.1 The Receiving Party may disclose the Confidential Digital Data as required by law or court order, including a subpoena or other form of compulsory legal process issued by a court or governmental entity. The Receiving Party may also disclose the Confidential Digital Data to its employees, consultants or contractors in order to perform services or work solely and exclusively for the Project, provided those employees, consultants and contractors are subject to the restrictions on the disclosure and use of Confidential Digital Data as set forth in this Agreement.

§ 2.4 The Transmitting Party retains its rights in the Digital Data. By transmitting the Digital Data, the Transmitting Party does not grant to the Receiving Party a sell, an assignment, or lease of those rights in the Digital Data including designs, drawings, information and depicted works to any person or entity; nor does the Transmitting Party convey to the Receiving Party any right in the software used to generate the Digital Data.

§ 2.5 To the fullest extent permitted by law, the Receiving Party shall indemnify and defend the Transmitting Party from and against all claims arising from or related to the Receiving Party's modification to, or unlicensed use of, the Digital Data.

ARTICLE 3 LICENSE CONDITIONS

The parties agree to the following conditions on the limited license granted in Section 2.1:
(State below rights or restrictions applicable to the Receiving Party's use of the Digital Data, requirements for data format, transmission method or other conditions on data to be transmitted.)

1. « Receiving Party agrees not to remove any copyright notices, labels or marks on the designs, drawings, information and depicted works within the Digital Data.

2. When the Digital Data is a building information model (BIM), the Receiving Party agrees that any model data provided in the Digital Data is for Receiving Party's reference only and does not alleviate the

Receiving Party from their own responsibilities in verification of level of development and use of the model such as, but not limited to, analysis, material take offs, cost estimating and scheduling.

3. Under no circumstances shall the transfer of ownership of the Digital Data, or hard copy thereof, be deemed to be a sale by the Transmitting Party of tangible goods, and the Transmitting Party makes no warranties, express or implied, of merchantability or of fitness for a particular purpose.

4. The Digital Data issued is current as of the date of issue indicated on the files. The Transmitting Party is not responsible or liable for providing any updates or modifications that may or may not have occurred since the issue date shown on the files. The Digital Data may also represent only a portion - not a complete set - of the construction documents or building information model data and, as such, it may be incomplete or inconsistent with the most recent design. The Transmitting Party makes no representation as to its completeness, currency or accuracy and the Transmitting Party shall not be responsible to advise Receiving Party of any changes which may hereafter be made to the Project's plans or configuration or other information contained in the Digital Data.

5. Receiving Party acknowledges that the designs, drawings, information and depicted works on the disk are protected by copyright laws, and that the Transmitting Party, or its Consultants, as appropriate, is the author and/or owner of same.

6. Transmitting Party, or its Consultants, as appropriate, retains all copyrights to the designs, drawings, information and depicted works in the Digital Data and grants to Receiving Party a limited license to reproduce such information in connection with Receiving Party's work on the Project, and no other.

7. The use of such information will be at Receiving Party's sole risk and without any liability, risk or legal exposure to the Transmitting Party, its Consultants, or the Project's Owner. The Digital Data is supplied as a convenience to the Receiving Party.. Due to the potential that the information set forth in the Digital Data can be modified by the Receiving Party or others, unintentionally or otherwise, the Receiving Party agrees to waive and release all claims or potential claims against the Owner, the Architect, its Consultants, and their respective officers, directors, members, employees and agents relating to, or arising out of, the use of the Digital Data, by reason of any act or omission of such parties, under any legal theories whatsoever, specifically including the negligence of any released party.

8. Receiving Party understands that any transfer or translation of Digital Data from one computer system or environment to another can result in loss of important data and Receiving Party assumes that risk.

9. If Receiving Party is a subcontractor, Receiving Party agrees to check with the Prime Contractor for the Project periodically to verify it has the most current version and/or any updates to the Digital Data.

10. All documents provided under this agreement are protected by © 2018 Berkebile Nelson Immenschuh McDowell, Incorporated.

11. Owner/Architect contractual agreement contains no requirements for Building Information Modeling deliverables to any other project participants.

12. Architect grants Contractor a limited license to reproduce such data for this Project only.

13. Contractor agrees not to sell, assign or lease any rights in the designs, drawings, information and depicted works in any form to any person or entity.

14. Contractor shall not create shop drawings from graphic duplications of contract documents and shall not, under any circumstances, mark up or modify electronically stamped version of design documents.

15. Contractor further agrees not to remove any copyright notices, labels or marks on the designs, drawings, information and depicted works.

16. Release of digital data format information to Contractor and its Subcontractors does not relieve either party from performing necessary coordination efforts to ensure that the contract documents are implemented in a complete and total manner. The Owner/Architect contractual agreement also contains no provisions for design team participation in contractor BIM coordination efforts.

17. Under no circumstances shall the transfer of ownership of such electronic data or hard copy thereof, be deemed to be a sale by the Architect of tangible goods, and the Architect makes no warranties, express or implied, of merchantability or of fitness for a particular purpose.

18. The Electronic Files issued are current as of the defined most recent substantial release. The Architect is not responsible or liable for providing any updates or modifications that may or may not have occurred since the issue date shown on the files. The Electronic Files may also represent only a portion - not a complete set - of the construction documents and, as such, they may be incomplete. Architect makes no representation as to its completeness, currency or accuracy and Architect shall not be responsible to advise Contractor of any changes which may hereafter be made to the Project plan or configuration or other information contained in the Electronic Files.

19. The Architect's Name, Logo and Seal if any will be removed from the sheet.

20. Contractor acknowledges that the designs, drawings, information and depicted works on the disk are protected by copyright laws, and that Architect, its Consultants, or the Owner as appropriate, is the author and/or owner of same.

21. Architect, its Consultants, or the Owner, as appropriate, retains all copyrights to the designs, drawings, information and depicted works on the disk and grants to Contractor a limited license to reproduce such information in connection with Contractor's work on the Project, and no other.

22. Electronic files are not contract documents and are not the "Original Documents" as defined by various statutes and regulations. If there is a discrepancy between electronic files and the contract documents, the contract documents shall govern.

23. The use of such information will be at Contractor's sole risk and without any liability, risk or legal exposure to the Owner, Architect, or its Consultants. These Electronic Files are supplied as a convenience to the Contractor and are provided in a editable format. Due to the potential that the information set forth in the Electronic Files can be modified by the Contractor or others, unintentionally or otherwise, the Contractor agrees to waive and release all claims or potential claims against the Owner, the Architect, its Consultants, and their respective officers, directors, members, employees and agents relating to, or arising out of, the use of the Electronic Files, by reason of any act or omission of such parties, under any legal theories whatsoever, specifically including the negligence of any released party.

24. Contractor understands that any transfer or translation of computer data from one computer system or environment to another can result in loss of important data and Contractor assumes that risk.

25. If Contractor is a subcontractor, Contractor agrees to check with the prime contractor periodically to verify it has the most current version and/or any updates to the Electronic Files.

26. This License Agreement terminates at the completion of the Project or the termination of the construction contract.

ARTICLE 4 LICENSING FEE OR OTHER COMPENSATION

The Receiving Party agrees to pay the Transmitting Party the following fee or other compensation for the Receiving Party's use of the Digital Data:
(State the fee, in dollars, or other method by which the Receiving Party will compensate the Transmitting Party for the Receiving Party's use of the Digital Data.)

«Zero Dollars ($0.00)

ARTICLE 5 DIGITAL DATA

The Parties agree that the following items constitute the Digital Data subject to the license granted in Section 2.1:
(Identify below, in detail, the information created or stored in digital form the parties intend to be subject to this Agreement.)

Architect will provide the Contractor with one set of electronic files or documents (upon completion of construction document design phase) for this project and a limited license to use and/or reproduce the same for their own use for shop/fabrication/record drawings, after signature(s) by the using party(s) is applied to this form.

Digital Data is defined as building information model (BIM), drawings, project information, communications, or designs created or stored for the Project in digital form and transmitted in electronic form and method as follows:

.1 The Digital Data consists of the following:

(List overall title or specific issuance, dates, etc.)
(List model name, individual file names, sheet numbers, dates, etc.)

.2 The Digital Data is transmitted in the format as follows:

(AutoDesk Revit, AutoCAD, Form Z, 3D Studio (3DS), Sketch UP, Rhino, etc.)
(Release Version No.)

.3 The Digital Data is transmitted in the method as follows:

(Electronic file transfer, electronic mail, CD ROM, etc.)
(Courier Delivery, U.S. Mail, by hand, etc.)

This Agreement is entered into as of the day and year first written above and will terminate upon Substantial Completion of the Project, as that term is defined in AIA Document A201™–2007, General Conditions of the Contract for Construction, unless otherwise agreed by the parties and set forth below.
(Indicate when this Agreement will terminate, if other than the date of Substantial Completion.)

Date of Termination: *(Indicate date here when this Agreement will terminate, if other than above)*

BNIM Architects	« »
TRANSMITTING PARTY *(Signature)*	**RECEIVING PARTY** *(Signature)*
« »« »	« »« »
(Printed name and title)	*(Printed name and title)*

SECTION 01 00 00 - GENERAL REQUIREMENTS

1.1 GENERAL
- A. Include all labor, materials, and services necessary for completion of all work shown prescribed, or reasonably implied, but not limited to that explicitly indicated.
- B. Bring omissions and conflicts between various elements of work to architect's attention immediately upon discovery and prior to proceeding with work involved. Notify owner in writing of all changes.
- C. Work by owner includes following:
  1. Classroom and computer lab furnishings
  2. Collision program storage racks
  3. Vocational shop equipment (refer to Section 01 00 02 for additional information on the scope of work provided by and excluded by the Vocational Shop Equipment Vendor)
     - a. Rohner Finishing Systems is the Vendor: www.rohnerspraybooths.com
     - b. Myers Brothers is the Product Representative: www.myersbrotherskc.com
     - c. Contractor shall be responsible for coordinating the equipment and work supplied by the Vendor with all base building work. Contractor's responsibilities include, but are not limited to:
       1) Project schedule.
       2) Job site safety.
       3) Receiving, unloading, and moving equipment crates to assembly location.
       4) Required duct supports.
       5) Fire suppression system within equipment.
       6) Exterior envelope penetrations and weather proofing.
       7) Building supply power to main control panel.
       8) Electrical equipment, including conduit, conductors, boxes, and fittings to wire all factory-supplied components.
       9) Concrete pit for downdraft Paint Booth, including steel edge angle.
       10) Disposal of crating and packaging.
       11) Associated Permits and Permit Fees.
- D. Owner furnished/contractor installed products include following:
  1. Projectors and Mounts
  2. Projection screens
  3. Whiteboards
  4. Frame puller
  5. Vehicle lift
  6. Air compressor (salvaged and relocated)
  7. Welding booths
- E. Progress Meetings: Conduct progress meeting at regular intervals including attendance by Contractor, Owner, Architect, Engineer, and others as needed for decisions, progress of work, coordination, or related topics for discussion based on the schedule or work activity in progress.

1.2 SUBSTITUTIONS:
- A. During bidding, submit written product substitution requests at least ten days prior to date for receipt of bids using "Substitution Request During the Bidding/Negotiation Period" form provided provided at the end of this section. Accepted substitutions to be issued in addendum.
- B. Submit product substitutions after bidding written request using "Substitution Request after Award of Contract" form provided provided at the end of this section for changes in products and methods of construction. Architect will review and notify contractor of acceptance or rejection.
  1. Substitutions for Convenience: Considered if received within 60 days after the Notice to Proceed.

1.3 SCHEDULE OF ALLOWANCES:
1. None.

1.4 SCHEDULE OF UNIT PRICES:
- A. Unit Price No. 1: Removal of unsatisfactory soil and replacement with satisfactory soil material.
  1. Description: Unsatisfactory soil excavation and disposal off site and replacement with satisfactory fill material or engineered fill from off site, as required, according to Section 31 20 00 “Earth Moving”.
  2. Unit of Measurement: Cubic Yard of soil excavated, based on survey of volume removed.
- B. Unit Price No. 2: Rock excavation and replacement with satisfactory soil material.
  1. Description: Classified rock excavation and disposal off site and replacement with satisfactory fill material or engineered fill from off site, as required, according to Section 31 20 00 “Earth Moving”.
  2. Unit of Measurement: Cubic Yard of rock excavated, based on survey of volume removed.
  3.

1.5 SCHEDULE OF ALTERNATES:
1. Refer to Section 01 23 00.

1.6 WORK RESTRICTIONS
- A. Notify utility locator service to locate utilities before site clearing or excavation.

B. Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
   1. Notify Owner not less than two days in advance of proposed utility interruptions.
   2. Obtain Owner's written permission before proceeding with utility interruptions.
C. Use of tobacco products and other controlled substances is not permitted within building or on project site.
D. Confine construction to areas where work is indicated. Keep driveways, walkways, corridors, parking lots, entrances, and other occupied or used facilities clear and available to owner, owner's employees, and emergency vehicles at all times.
E. Coordinate with owner delivery of goods and materials, route of accessibility, and location of trash removal devices.
F. Limit work in existing building to 7:00 am to 5:00 pm Monday through Friday.

1.7 CONSTRUCTION SCHEDULE
A. Prepare a construction schedule indicating major areas of work and actual completion date to be submitted within 10 days of the date established for Commencement of the Work. Coordinate each element with other activities. Show each activity in proper sequence. Indicate sequences necessary for completion of related Work.
   1. Revise the schedule after each meeting or activity where revisions have been made.

1.8 SUBMITTALS
A. Architect's Digital Data Files: One set of digital data files of the Contract Drawings will be provided by Architect for Contractor's use during construction. Execute data licensing agreement in the form of provided by Architect.
B. Coordinate submittal preparation and review with construction schedule, fabrication lead-times, other submittals, and activities that require sequential operations. Allow 10 working days for review of submittals by architect.
C. Submittals to include following as appropriate per section: samples, shop drawings, delegated design, coordination drawings, and inspection reports.
D. Transmit submittals including photographs of samples using portable document format (PDF) utilizing web-based project software which generates transmittals. Attach same transmittal to samples using physical delivery. Submittals will be review and returned by architect in same manner as received
E. Generate and transmit Requests for Information utilizing web-based project software. Allow 3 working days for architect's response. RFIs received by Architect after 1:00 pm will be considered as received the following working day.

1.9 DELEGATED-DESIGN SERVICE
A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents or where items are not covered on the Structural Drawings but are indicated to comply with design loads, provide products and systems complying with specific performance and design criteria indicated and include structural analysis data signed and sealed by the qualified professional engineer licensed in the State of Missouri responsible for their preparation and who certifies that they comply with requirements and recognized engineering principles and practice.
   1. If required by the City, design drawings, calculations and shop drawings shall be sealed and signed by a Professional Engineer registered in the State of Missouri, submitted to the Owner and Architect for review, and submitted to the City of Lee’s Summit, Missouri by the Contractor upon receipt of returned information from the Architect.

1.10 PROJECT REQUIREMENTS
A. Where titles below introduce products or lists of products or manufacturers, the following requirements apply to product selection:
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
   2. Products: Subject to compliance with requirements, provide one of the products listed.
   3. Basis of Design Product: Subject to compliance with requirements, provide product listed or comparable product.
B. Products or materials not listed with requirements should meet manufacturer’s written or drawn requirements. Unless otherwise indicated, installation to meet manufacturer’s written or drawn requirements.

1.11 DELIVERY, STORAGE, AND HANDLING
A. Stack work to be installed protected from weather, moisture, soiling, abrasion, deformation, extreme temperatures, direct exposure to sun, and humidity per manufacturer’s written recommendations.
B. Do not deliver finish work until painting and similar operations that could damage work have been completed in installation areas.

1.12 PROJECT CONDITIONS
A. Field Measurements: Verify actual locations of walls and other construction contiguous with work to be installed by field measurements before fabrication and indicate measurements on Shop Drawings.

B. Environmental Limitations: Do not install work until ambient and substrate temperature, humidity and moisture conditions, and ventilation meet manufacturer's written recommendations.
C. If there is a conflict between the Bid Documents and the Shop Drawings, the Bid Documents prevail.
D. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
E. Coordinate installation of anchorages and blocking for work to be installed.

1.13 TEMPORARY FACILITIES AND CONTROLS

A. Contractor to contain work within the work area and to protect the public from injuries at all times during the construction period. Contractor shall use necessary methods to protect adjacent areas of occupied or finished work from dust, debris, and noise. Contractor shall secure the work at the end of each work day.
B. Clean and remove debris and secure work at end of each work day.
C. Provide temporary toilets, wash facilities, and drinking water for use by construction personnel.
D. Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material according to applicable laws and regulations.
E. Provide temporary barricades, warning signs, and lights to protect public and construction personnel from construction hazards.
F. Notify owner not less than 2 days prior to proposed utility interruptions.
G. Notify owner not less than 2 days prior to proposed operations resulting in high levels of noise, vibration, odors, or other disruption to owner's operation.
H. Use existing water, sewer, and electric power service permitted without metering and payment of use charges. Provide connections and extensions as required for construction operations.
I. **Pay**utility service use charges for all utility usage by all entities for construction operations.
J. Examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed before cutting. Employ skilled workmen to perform cutting and patching. Patch with durable seams that are as invisible as possible and restore exposed finishes to eliminate evidence of patching and refinishing.
K. Areas and items damaged, marred, reinstalled or otherwise affected by the Work of this contract shall be patched, restored to match existing, or replaced even if no specific work is noted or otherwise identified. Clean areas and spaces where cutting and patching are performed.

1.14 CONSTRUCTION WASTE MANAGEMENT

A. Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total nonhazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvaging of materials.

1.15 ADJUSTING, CLEANING, AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.
B. Protect work from the following:
    1. Contact with contaminating substances resulting from construction operations.
    2. Damage and wear during the remainder of construction period.
    3. Interior materials from weather, condensation, direct sunlight, construction.
        a. Remove and replace materials that are wet, moisture damaged, or mold damaged.
    4. Use protective methods and materials, including temporary covering, recommended in writing by finish manufacturer.
    5. Remove and replace work that has been damaged during construction period.
C. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.
D. Adjust exterior operating units for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
E. Adjust hardware for smooth operation and tight closure.

1.16 CLOSEOUT PROCEDURES

A. Substantial Completion: On receipt of a request for inspection, the Architect will either proceed with inspection or advise the Contractor of unfilled requirements. The Architect will prepare the Certificate of Substantial Completion following inspection or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.
    1. The Architect will repeat inspection one time when requested and assured that the Work has been substantially completed.
    2. Results of the completed inspection will form the basis of requirements for final acceptance.
B. Final Completion: After completing, construction clean and inspection corrections, submit record documents to the Architect and request for final inspection. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
    1. Electronically submit product data sheets, record drawings, record specifications, approved shop drawings, operation and maintenance manuals, and warranties. Deliver keys, attic stock materials, and other required administrative items to owner.

2. Coordinate demonstration and training sessions per Sections 02 – 33 for instructing Owner's personnel.

END OF SECTION 01 00 00

Fall Semester	2021
New full-time faculty orientation	August 19 and 20
New adjunct faculty orientation	Saturday, August 21
Campus In-Service	Monday, August 23 (8:30-12:00)
Faculty Association/Division Meetings	Monday, August 23 (12:00-4:30)
Fall Semester Begins	Tuesday, August 24
Labor Day holiday, no classes (Offices/Campus Closed)	Monday, September 6
Second 8-week classes begin	Monday, October 18
District In-Service	Tuesday, October 19
Last date to withdraw without grade	Wednesday, November 17
Thanksgiving holiday- no classes (Offices open Nov. 24)	November 24-November 26
Classes resume	Monday, November 29
Last date for day and evening classes	Monday, December 13
Final exams, day and evening	December 14-20
Grading day, Grades due at 4 p.m.	Tuesday, December 21
End of Term Processing	Wednesday, December 22
Holiday break, offices closed	December 23-Jan 5

Spring Semester	2022
Faculty Convocation Day 1	Thursday, January 13
Faculty Convocation/Assessment Day 2	Friday, January 14
New adjunct faculty orientation	Saturday, January 15
Martin Luther King Jr. holiday (Campuses/Offices closed)	Monday, January 17
Spring Semester Begins	Tuesday, January 18
Spring break (Campuses/Offices closed)	March 14-18
Classes resume/Second 8-week classes begin	Monday, March 21
Last date to withdraw without grade	Monday, April 18
Last date for classes, day and evening	Monday, May 9
Final exams, day and evening	May 10-16
Grading day, Grades due at 4 p.m.	Tuesday, May 17
End of Term Processing	Wednesday, May 18
Commencement	Thursday, May 19

Summer Semester	2022
Summer Term Begins	Monday, June 6
Independence Day holiday, (Campuses/Offices closed)	Monday, July 4
Last date to withdraw without grade	Thursday, July 15
Last date for classes, day and evening	Thursday, July 28
Grades due noon	Monday, August 1

Myers Brothers
1210 W 28th Street
Kansas City, MO 64108
Toll Free: 1-800-264-2404
Phone: (816) 931-5501
Fax: (816) 753-3564
www.myersbrotherskc.com

Date: 9/9/21

Customer/Address: Metropolitan Community College

Subject: Paint Booth Budgetary Proposal

Quotation Number: 90921 Revision: Move MAU to Booth top

To: Jeremy Kahm

Mr. Kahm,

It is my pleasure to submit to you the following proposal.

(1) Rohner # IDD-FP-14-9-26-CP, Industrial Downdraft Spray Booth with Pressurized Ceiling Plenum.

Exhaust -	Dry filter exhaust pans located in concrete pit beneath grating
Intake -	Pressurized supply plenum located at booth ceiling.
Working Dim:	14'-0" W x 9'-0" H x 26'-0" D
Overall Dim:	15'-8" W x 13'-0" H x 26'-4" D
Product doors:	(1) Set of tri-fold product doors 10'-0" W x 7'-6" H clear opening (Dimensions are approximate and will be verified on approvals)

Specifications:

- Booth constructed using 18ga. **Powder Coated White** sheet steel cold formed and pre-punched for nut and bolt assembly.
- Booth rigidly reinforced with 14-10 ga. galvanized cold formed sheet steel frames sized for seismic design category C. Consult the factory for rigid reinforcement for categories D and for seismic/stamped engineered drawings.
- (10) Enclosed Class 1 Div. II UL listed fluorescent inside access light fixtures, 115V-277V/1/60hz dual voltage electronic ballast with one set of color correct T8-32W fluorescent lamps. Fixtures located in ceiling, hip or wall panels and supplied with angle mounting frame.
- Exhaust filter pans - exhaust filter pans with adjustable filter balancing baffles. Each filter pan is designed with the Rohner *Quick Change* roller systems enabling the roll media exhaust filters to be change with the removal of only two pieces of access grating. Filter pans come complete with one set of roll media standard paint collector pad.
- Exhaust Pit Grating Packages – exhaust grate package rated for 200lb sq./ft. uniform load.
- (1) Supply plenum- 20" x 20" intake filter grids complete with one set of tacky intake filters.
- (1) 42" dia. spark resistant tube axial heavy duty welded construction belt drive exhaust fan with 5 hp TEFC 460V/3/60 motor rated for 18,200 CFM @ .85" S.P., **average booth velocity > 50' per minute.**

- (1) Set of Tri-fold product doors constructed with 2 x 2 powder coated tube steel, 12ga. galvanized cold formed brackets, and 18 ga. galvanized skin. Doors come complete with heavy duty powdered coated hinges, Brixon safety latches, and powder coated door handles. Heavy duty door frames are constructed using 2 x 4 powder coated tube steel with 12ga. galvanized adjustable door closure angles on top and sides. Each door sets includes neoprene “D” gaskets and 1/8” EPDM floor sweep for a positive seal.
- (3) 18” x 24” tempered glass observation window located in product door.
- (1) 3' x 7' personnel door constructed with 2 x 2 welded and powder coated tube steel frame/jamb and 18ga. galvanized door skin with 18” x 24” tempered glass observation window. Door comes complete with three hinges, two handles, Brixon latch, neoprene “D” gaskets and 1/8” EPDM floor sweep.
- (3) Door limit switch with mounting bracket and hardware. Approvals include CSA/FM CI, Div. 2, Groups A-D; CI II, Div. 1 & 2, Groups E, F & G.
- (1) 3/4" air solenoid valve designed to interlock with spray apparatus and only allow paint application while the exhaust system is operational (Required to meet NFPA-33 Fire code)
- All assembly hardware
- 3D exploded view assembly drawings and construction detail sheets.

Rohner # TA-VRH, Vertical Indoor Direct Gas Fired Makeup Air Unit with 50% Reduced Air High Temperature Bake Cycle

CFM:	18,200 CFM
HP/V:	15 HP 460V/3/60
BTU/Temp rise:	2.0 million BTU, 100 Deg. F temp rise bake
Operator Controls:	**Compact PLC based control center** - 24VDC power supply, 24 I/O PLC controller, PID temperature control relay with fuzzy logic and auto tuning & 5.7” QVGA color touch screen HMI. (1) 15 hp. Supply blower VFD and (1) 5 hp. exhaust fan VFD with auto booth pressure control. (Refer to Rohner CP “control panel” brochure for details)

Standard Features:

- CABINET CONSTRUCTION- Unit shall be of internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. Where top panels are joined there shall be a standing seam to insure positive weather protection. All metal-to-metal surfaces exposed to the weather shall be sealed, requiring no caulking at job site. All components shall be easily accessible through removable doors.
- FANS- Centrifugal fans shall be double width, double inlet. Fan and motor shall be mounted on a common base and shall be internally isolated. All blower wheels balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated ball bearings (up to size 118) or ball bearing pillow blocks (size 120 and larger). Bearings shall be a minimum (L10) life in excess of 100,000 hours at maximum cataloged speeds.
- MOTOR AND DRIVES- Motors shall be energy efficient, complying with EPACT standards, for single speed ODP and TE enclosures. Motors shall be permanently lubricated, heavy duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150 % of driven horsepower. Pulleys shall be cast and have machined surfaces, 10 horsepower and less shall be supplied with an adjustable drive pulley.
- GAS TRAIN AND CONTROLS- Direct-gas fired system shall have a draw through design and field adjustable burner baffles. Gas trains shall include a pilot ignition system and shall have digital coded fault indicator capability. Fault indicator shall provide service history by storing codes for the last five faults. Dual safety shutoff valves shall be industrial duty and use 120 VAC control signals. Temperature control shall incorporate a Maxitrol electronic modulation control system.

- ELECTRICAL- All internal electrical components shall be prewired for single point power connection. All electrical components shall be UL listed, recognized or classified where applicable and wired in compliance with the National Electrical Code. Control center shall include motor starter, control circuit fusing, control transformer for 24 VAC circuit, integral disconnect switch and terminal strip. Contactors, Class 20 adjustable overload protection and single-phase protection shall be standard.
- FILTER BOX- Filters shall be mounted in a V-bank arrangement such that velocities across the filters do not exceed 550 ft/min. Filters shall be easily accessible through a removable access panel. Minimum filters shall be rated MERV 8 and constructed from poly material.
- BACK DRAFT DAMPER- unit is equipped with discharge or intake motorized damper to control building draft when not in operation.
- VARIABLE 50% REDUCED VOLUME BAKE- Volume shall be varied by either a 2-speed motor or variable frequency drive. Input signal for fan speed shall be from potentiometer or manual switch. A self-adjusting burner bypass damper shall maintain a constant air volume across the burner to ensure proper gas combustion. Bypass damper shall operate automatically without an electronic input control signal.

Exhaust Duct Package:

- (1) 42” exhaust duct package to each include: (4) 4’ section of straight duct, (1) 2’ section straight duct with cleanout access door and (1) damper cap.

M.A.U. Discharge Duct Package:

- (1) M.A.U. discharge duct package to each include: (2) 4’ section of straight duct, (1) elbow, (1) offset/transition and (1) flex connection

M.A.U Intake Duct Package:

- (1) M.A.U. Intake duct package to each include: (1) 90 deg. elbow, (4) 4’ section of straight duct and (1) two-side mushroom intake cap with bird screen.

Booth Options:

Product door (each)

Note: Duct packages sized for 15’ roof with straight runs unless otherwise noted. All duct support by others. Note additional duct materials may be required to accommodate final equipment to building configuration and will be billed as extra.

(1) Rohner # MCD-WP-24-9-26-FCP, Modified Cross-draft Booth with Ceiling Plenum. (prep)

Exhaust - Dry filter pant leg exhaust plenum located in at rear of booth
Intake - Pressurized supply plenum located at front of booth ceiling.

Working Dim: 24'-0" W x 9'-0" H x 26'-0" D
Overall Dim: 26'-0" W x 13'-0" H x 26'-4" D
Product doors: (2) Sets of Curtains 14’-0” W x 7’-6” H
Center Divide: (1) Set of Curtains 26’-0” l x 7’-6” H
(Dimensions are approximate and will be verified on approvals)

Specifications:

- Booth constructed using 18ga. **powder coated white** sheet steel cold formed and pre-punched for nut and bolt assembly.
- Booth rigidly reinforced with 14-10 ga. galvanized cold formed sheet steel frames sized for seismic design category C. Consult the factory for rigid reinforcement for categories D and E and for seismic/stamped engineered drawings.

- (10) Enclosed Class 1 Div. II UL listed fluorescent inside access light fixtures, 115V-277V/1/60hz dual voltage electronic ballast with one set of color correct T8-32W fluorescent lamps. Fixtures located in ceiling, hip or wall panels and supplied with angle mounting frame.
- (1) Exhaust plenum- 20" X 20" exhaust filters grids complete wire snap-in grids and one set of standard paint collector pads.
- (1) Supply plenum- 20" x 20" intake filter grids complete with one set of tacky intake filters.
- (1) 48" dia. spark resistant tube axial heavy duty welded construction belt drive exhaust fan with 5 hp TEFC 460V/3/60 motor rated for 28,200 CFM @ .5" S.P., **average booth velocity > 100' per minute.**
- (3) Curtain wall packages: ***Suspended 18" from booth ceiling***, constructed using NFPA-701 rated flame retardant materials including 14 oz. reinforced upper and lower sections and a 20 mil. PVC clear center windowed section. All seams are double lock stitched using mildew / rot resistant thread, all edges are completely finished. Side edges feature two 1' hook & loop fasteners per side for easy attachment to walls or other curtains. The bottom edge contains a fully enclosed chain weighted lower hem and brass grommets. Grommets along the top are 1' on center. Original Goff's Curtain Wall packages listed above also include a 16ga. channel track system with dual wheeled carrier roller hooks 1' on center along the top of the curtain and either suspend, flush, or wall mount hardware for easy installation.
- (2) 3' x 7' personnel door constructed with 2 x 2 welded and powder coated tube steel frame/jamb and 18ga. galvanized door skin with 18" x 24" tempered glass observation window. Door comes complete with three hinges, two handles, Brixon latch, neoprene "D" gaskets and 1/8" EPDM floor sweep.
- (1) 3/4" air solenoid valve designed to interlock with spray apparatus and only allow paint application while the exhaust system is operational (Required to meet NFPA-33 Fire code)
- All assembly hardware
- 3D exploded view assembly drawings and construction detail sheets.

Rohner # TA-VRH, Vertical Indoor Direct Gas Fired Makeup Air Unit

CFM:	25,200 CFM
HP/V:	20 HP 460V/3/60
BTU/Temp rise:	2.7 million BTU
Operator Controls:	**Compact PLC based control center** - 24VDC power supply, 24 I/O PLC controller, PID temperature control relay with fuzzy logic and auto tuning & 5.7" QVGA color touch screen HMI. (1) 20 hp. Supply blower VFD and (1) 5 hp. exhaust fan VFD with auto booth pressure control. (Refer to Rohner CP "control panel" brochure for details)

Standard Features:

- CABINET CONSTRUCTION- Unit shall be of internal frame type construction of galvanized steel. All frames and panels shall be G90 galvanized steel. Where top panels are joined there shall be a standing seam to insure positive weather protection. All metal-to-metal surfaces exposed to the weather shall be sealed, requiring no caulking at job site. All components shall be easily accessible through removable doors.
- FANS- Centrifugal fans shall be double width, double inlet. Fan and motor shall be mounted on a common base and shall be internally isolated. All blower wheels balanced. Ground and polished steel fan shafts shall be mounted in permanently lubricated ball bearings (up to size 118) or ball bearing pillow blocks (size 120 and larger). Bearings shall be a minimum (L10) life in excess of 100,000 hours at maximum cataloged speeds.
- MOTOR AND DRIVES- Motors shall be energy efficient, complying with EPACT standards, for single speed ODP and TE enclosures. Motors shall be permanently lubricated, heavy duty type, matched to the fan load and furnished at the specified voltage, phase and enclosure. Drives shall be sized for a minimum of 150 % of driven horsepower. Pulleys shall be cast and

have machined surfaces, 10 horsepower and less shall be supplied with an adjustable drive pulley.

- GAS TRAIN AND CONTROLS- Direct-gas fired system shall have a draw through design and field adjustable burner baffles. Gas trains shall include a pilot ignition system and shall have digital coded fault indicator capability. Fault indicator shall provide service history by storing codes for the last five faults. Dual safety shutoff valves shall be industrial duty and use 120 VAC control signals. Temperature control shall incorporate a Maxitrol electronic modulation control system.
- ELECTRICAL- All internal electrical components shall be prewired for single point power connection. All electrical components shall be UL listed, recognized or classified where applicable and wired in compliance with the National Electrical Code. Control center shall include motor starter, control circuit fusing, control transformer for 24 VAC circuit, integral disconnect switch and terminal strip. Contactors, Class 20 adjustable overload protection and single-phase protection shall be standard.
- FILTER BOX- Filters shall be mounted in a V-bank arrangement such that velocities across the filters do not exceed 550 ft/min. Filters shall be easily accessible through a removable access panel. Minimum filters shall be rated MERV 8 and constructed from poly material.
- BACK DRAFT DAMPER- unit is equipped with discharge or intake motorized damper to control building draft when not in operation.
- VARIABLE 50% REDUCED VOLUME BAKE- Volume shall be varied by either a 2-speed motor or variable frequency drive. Input signal for fan speed shall be from potentiometer or manual switch. A self-adjusting burner bypass damper shall maintain a constant air volume across the burner to ensure proper gas combustion. Bypass damper shall operate automatically without an electronic input control signal.

Exhaust Duct Package:

- (1) 48” exhaust duct package to each include: (1) 4’ section of straight duct, (1) 2’ section straight duct with cleanout access door and (1) damper cap.

M.A.U. Discharge Duct Package:

- (1) M.A.U. discharge duct package to each include: (4) 4’ section of straight duct, (1) elbow, (1) offset/transition and (1) flex connection

M.A.U Intake Duct Package:

- (1) M.A.U. Intake duct package to each include: (1) 90 deg. elbow, (4) 4’ section of straight duct and (1) two-side mushroom intake cap with bird screen.

Note: Duct packages sized for 15’ roof with straight runs unless otherwise noted. All duct support by others. Note additional duct materials may be required to accommodate final equipment to building configuration and will be billed as extra.

(1) Rohner # MX-9-8-12, Paint Mix Room

Exhaust -	Corner vertical wall with perforated panels at bottom
Supply -	Passive air pulled through supply filters in top of end wall
Working Dim:	9’-0” W x 8’-0” H x 12’-0” D
Overall Dim:	9-4” W x 9’-2” H x 12’-4” D (Dimensions are approximate and will be verified on approvals)

Specifications:

- Room constructed using 18ga. **powder coated white** sheet steel cold formed and pre-punched for nut and bolt assembly.

- (3) Industrial UL listed fluorescent four tube light fixtures, 115V-277V/1/60hz dual voltage electronic ballast with one set of color correct T8-32W fluorescent lamps. Fixtures to be located in ceiling panels and supplied with angle mounting frame, open cell adhesive backed foam, 3/16" tempered glass panel and hold-down brackets.
- Exhaust plenum- (1) vertical external corner plenum with low perforated inlet to extract solvents from floor level.
- Supply plenum- 20" x 20" intake filter grids complete with one set of tacky intake filters located high in wall panels opposite exhaust.
- (1) 3' x 7' personnel door constructed with 2 x 2 welded and powder coated tube steel with 18ga. galvanized door skin with 18" x 24" tempered glass observation window. Door comes complete with three hinges, two handles, and one Brixon latch. Door is mounted on a 4" spill containment threshold.
- (1) 10" direct drive centrifugal inline exhaust/supply fan with 1/4hp 120V/1/60 explosion proof motor rated for 1,291 CFM @ .5" S.P., **sized for minimum 8 times the 1 CFM per Sq./ft. required by NFPA 33.** Galvanized steel housing, backward inclined aluminum wheel, duct flanges and two bolted access panels.
- All assembly hardware

Mix Room Duct Package:

- (1) 12" Mix room duct package to each include: (1) 10' section of straight duct, (1) connecting collar and (1) globe vent.

Note: Duct package sized for 15' roof with straight runs unless otherwise noted. All duct support by others. Note additional duct materials may be required to accommodate final equipment to building configuration and will be billed as extra.

Startup Service

- Factory technician to provide onsite equipment startup and operator training. Startup service will be performed over one consecutive 6-day trip, portal to portal.

(1) Factory Authorized Equipment Assembly

Mechanical - Mechanical assembly includes uncrating Rohner factory supplied equipment, assembling equipment housing, anchoring housing, hanging product doors, installing light fixtures, setting mechanical fan and M.A.U. units and mounting equipment accessories.

Ductwork - Install factory supplied duct packages through Customer supplied and installed roof jack/curb (weather proofing and final seal by Customer). Standard duct installation is for straight runs terminating approximately 6' above penetration elevation. Duct straps support will be provided and installed transferring the duct load to the equipment and building roof structure.

NOTE: This is not a "Turn-Key" installation quote. Addition services and requirement will be required to make equipment fully functional and meet local code requirements. Customer is responsible for receiving, unloading and moving equipment crates adjacent to equipment assembly location. Customer to provide crating and packing disposal. Utilities to equipment service points of connection are not included in this estimate. Labor costs are estimated as **Davis Bacon Wage**.

The following items are <u>not</u> included in Rohner contracted services (See Note):

* Dry chemical / water type suppression system to meet code provided by others.

* Permit service to acquire permits required to install a spray booth.

* Roof/wall penetrations and weather proofing.

* Building supply power to main control panel.

* Electrical - Provide and install conduit, conductors, boxes and fittings to wire all factory supplied components and accessories back to Rohner supplied control panel.

* Concrete pits

* Customer to provide crating and packing disposal.

NOTES:
***** All permit fees and engineering costs (as required by the city) are in addition and are not included in this proposal.***
- Permits required for work done by any customer-supplied contractors are the responsibility of the customer.
******Duct packages sized for 15' roof with straight runs unless otherwise noted. All duct support by others. Note: Additional duct materials may be required to accommodate final equipment to building configuration and will be billed as extra.***

Summary:

IDD-FP-14-9-26-CP, Industrial Downdraft Spray Booth (Spray Booth)

MCD-PP-28-9-26-FCP, Modified Cross-draft Booth (Prep Booth)

MX-9-8-12, Paint Mix Room

Ductwork

Startup [redacted]

Equipment Assembly excludes concrete work for exhaust plenum

Total
(F.O.B. Vancouver, WA)

[redacted]

Booth Option:

Product door (each)

Clarifications:

A signed copy of our proposal is required prior to processing your order. By issuing a Purchase Order, it is understood that the customers has read and agrees to all terms and conditions.

By accepting this proposal, all parties agree that the quotation is the governing document and that the proposal's scope of work and terms supersede discrepancies that may exist on the Purchase Order. Should the scope of work change during submittals, a revised proposal, updated purchase order and/or signed change orders will be required.

This proposal is limited to the equipment and services described above. Any additional equipment, permits and/or resources required to fulfill the scope of this project will be the responsibility of others.

This scope does not include provision or replacement of existing parts or system hardware found to be defective or unsuitable.

In the event the products contained in our proposal are NOT installed by Myers Brothers as a "Complete Install System", it is understood that it will be the responsibility of the customer or customer's installer/integrator for proper functionality. Myers Brothers will consider these products as "components" and integration/functionality is ultimately the responsibility of the customer.

Additional engineering, consultation, supervision, start up, training and/or services not included in this proposal are available at the current Per Diem Rate.

For Paint Booth, Paint Kitchen and or Oven installations, it is the responsibility of the customer to ensure the floor is level.

Paint booth installation costs are to be considered as "Best Estimate" until signed approval drawings have been received and reviewed.

Our proposal does not include any off-set that may be required for exhaust stacks or AMU intake duct.

The customer must arrange for building penetrations to be made before or while installation crew is on sight. If not, the customer will be responsible for finalizing exhaust stack installation or pay Myers Brothers for the return site call.

Unless included in our proposal of an exisiting booth demo, the customer will be responsible for removing all filters and cleaning of the booth prior to the start of the demo. Customer will be responsible for all debris and disposal of such.
Supply of additional safety related equipment not specifically mentioned in the body of this proposal will be the responsibility of the customer.

PLEASE VERIFY CORRECT VOLTAGE, PHASE AND ROOF PITCH. MYERS BROTHERS WILL NOT BE RESPONSIBLE FOR BACK CHARGES RELATED TO THE ABOVE ITEMS WHEN PROVIDED WITH INCORRECT INFORMATION.

An additional charge of $2,500.00 per day will be incurred by the customer if work stoppage occurs for the following reasons: Wrong measurements by customer, wrong items ordered by customer, not ready with a clean and usable job site, no electric/ heat available on job site, no rental equipment available on job site (if supplied by customer).

Receiving, Unloading and Inspecting Equipment for damage at the job site is the responsibility of the customer.

Customer must provide a safe and suitable storage area for all equipment shipped to job-site.

Work site must be clear, clean and available to conduct any installation work. Proper heat and or cooling MUST be provided to conduct any installation work.

Myers Brothers reserve the right to correct all typographical errors that may exist, whether in scope or pricing.

Any alterations or deviations from the plans and/or specifications involving extra costs or credit to the project will be executed only upon written order. The written order shall reflect the extra charge or credit resulting from said change.

Removal of excessive amounts of water, solid contaminants, etc. from the air supply will be the responsibility of the customer.

Permits, fire protection or any items required but not listed in this proposal are to be supplied by others.

Unless otherwise noted, all required utilities (Air and Electric) are to be provided to "Point of Use" by the customer.

Unless otherwise noted, any installation or supervision of installation shall be conducted during normal business hours. Those hours are 8:00 AM to 4:30 PM, Monday through Friday.

All documentation, training, manuals and graphics will be in English.

Services & Equipment to Be Provided By Others

The following may be required for your equipment but are **not** included by Myers Brothers in this proposal:

- **Concrete work for pit grating**
- Gas piping and plumbing to makeup air unit
- Unload at the jobsite
- Install Interior Sprinkler Piping and Heads in accordance with NFPA-13
- Electrical service to Control Panel
- Electrical conduit and wire runs
- **Roof penetrations and Sealing**
- Curbs or stands
- Building Modifications
- **Fire protection**
- Lighting other than specified
- Debris Containers & Disposal
- Air replacement
- Taxes or permits

Myers Brothers General Terms and Conditions

General

Acceptance of Buyer's order is conditioned upon Buyer's assent to Myers Brothers "Conditions of Sale" set forth below and any additional terms and conditions contained in Myers Brothers proposal. Myers Brothers agrees to furnish product and services only upon these conditions. Acceptance by Myers Brothers of any order, or Buyer's acceptance of Myers Brothers proposal, is expressly limited to and conditioned upon Buyer's acceptance of these terms and conditions, payment for or acceptance of any performance by Myers Brothers being accepted. These terms and conditions may not be changed or superseded by any different or additional terms and conditions proposed by Buyer unless and until they are agreed to and accepted by Myers Brothers in writing.

Delivery

At the time of the order, the equipment listed above may require submittal drawings. These submittal drawings will not be issued before a purchase order and the above terms have been approved. After the purchase order, Myers Brothers will supply submittal drawings for your approval in approximately 3 weeks or sooner. Shipment of the equipment **TBD** after receipt of approved drawings.

Price

Unless otherwise specified in writing, all proposals expire (30) thirty days from the date thereof.

Payment Terms

40% Down with Purchase Order, 50% Prior to Shipping, 10% Due Net 30-Days after receiving.

Payment

Payment terms are net 30 days from date of invoice, unless otherwise stated. If payments are not made when due, Buyer shall pay a late charge equal to the lesser of 1.5% per month, or the highest applicable rate allowed by law on all such overdue amounts.

Changes

Any Changes requested by Buyer to the scope of work accepted by Myers Brothers must be in writing and any changes or adjustments to price, schedule, guarantees or other provisions resulting from such changes, to become effective, must be mutually agreed to in a writing signed by both Myers Brothers and Buyer.

Insurance

Until title of the equipment transfers to Buyer, Buyer agrees, at its own cost and expense, and while the equipment is in transit to Buyer, to keep the equipment fully insured for risk of loss for not less than the replacement value of the equipment and in the joint names of Myers Brothers and Buyer.

Shipping

Myers Brothers will deliver equipment F.O.B. point of shipment. Buyer shall be responsible for and pay all shipping costs, duties, fees and taxes unless otherwise stated. Title to the equipment shall remain in Myers Brothers until fully paid. Risk of loss or damage during shipping shall be Buyer’s responsibility. Where scheduled delivery of equipment is delayed by Buyer or by Force Majeure, Myers Brothers may deliver the equipment by moving it to storage for the account of, at risk of, and at Buyer’s expense. Shipping dates are based upon prompt receipt of all necessary information including when and where delivery will occur and name of carrier and name of customs broker. All delivery dates are approximate. Any claims for shortages or other errors in delivery must be made in writing to Myers Brothers within ten days of delivery.

Force Majeure

Myers Brothers shall not be liable for loss, damage, or delay, nor be deemed to be in default from causes beyond its reasonable control or from fire, strike, labor difficulties, acts or omissions of any governmental authority or of Buyer, compliance with import or export regulations, insurrection, riot, embargo, delays or shortages in transportation or inability to obtain necessary labor, materials, or manufacturing facility from usual sources, or from delays in the performance of its suppliers due to any of the foregoing causes. In the event of delay due to any such cause, the time for performance will be extended by a period of time equal to the time lost by reason of such delay and other affected contract provisions shall be equitably adjusted.

Warranties

Equipment Warranty – Myers Brothers shall pass through and assign to Buyer any manufacturer's warranty in regard to equipment installed or parts used. Buyer's recourse is limited to the repair or replacement hereunder and shall be exclusive of any removal or installation costs, freight or insurance. Myers Brothers shall not be responsible for the cost of labor or expense in providing working access to make a repair or replacement.
Condition of Warranty – No warranty shall apply to any equipment or parts which (1) have been improperly installed, repaired or altered, by anyone other than Myers Brothers; (2) have been subject to misuse, negligence or accident; (3) have been used in a manner contrary to standard, Manufacture's or Myers Brothers operating or maintenance procedures; or (4) any equipment or part that is not customarily warranted because of normal wear and tear during use.

Limitations of Liability

In no event shall Myers Brothers or its suppliers be liable, whether arising under performance of this contract or breach of this contract, tort, including negligence and strict liability, or otherwise, for loss of anticipated profits, loss by reason of plant shutdown, non-operation or increased expense of operation, service interruptions, claims of customers, cost of money, loss of use of capital or revenue, or for any special, incidental or consequential loss or damage.
Myers Brothers liability on any claim of any kind, including negligence or strict liability, for any loss or damage arising out of, or resulting from this contract, or from its performance or breach, or from the manufacturer, sale, delivery, resale, installation or technical consultation for use of any equipment covered by or furnished under this contract shall in no case exceed the purchase price allocable to the equipment, part, service, or software which gives rise to the claim. Neither Myers Brothers nor any of its suppliers assume any liability whatsoever for any form of injury or damage whether to persons or property or the equipment furnished hereunder, caused directly or indirectly by Buyer and/or the user of the equipment arising out of the performance of the contract or the use of the equipment and the Buyer and/or the user of the equipment shall indemnify and hold harmless Myers Brothers and its suppliers from any liability resulting from such injury or damage no matter how caused.

Taxes

The price does not include any Federal, State or Local property, license, privilege, sales, use, excise, gross receipts, or other like taxes which may or now or hereafter be applicable to, measured by, or imposed upon or with respect to the transaction,

the property, its sale, its value or its use, or any services performed in connection herewith. Buyer agrees to pay or reimburse any such taxes which Myers Brothers or its suppliers are required to pay or collect. If Buyer is exempt from the payment of any tax or holds a direct pay permit, Buyer shall, upon placing an order with Myers Brothers, give Myers Brothers a copy of any such certificate or permit. Unless otherwise stated in Myers Brothers proposal, price does not include any custom duties and any other importations or exportation fees.

Laws and Regulations

Myers Brothers does not accept responsibility for compliance with any federal, state or local laws and regulations, except as expressly set forth herein, and compliance with all laws and regulations related to the use or operation of product or services is the sole responsibility of Buyer. All laws and regulations referenced herein shall be those in effect as of the date Myers Brothers submits a proposal to Buyer. Any product supplied by Myers Brothers will comply with the relevant standards of the Occupational Safety and Health Act of 1970 (OSHA) and the regulations promulgated there under as of the date of Myers Brothers proposal. In no event will Myers Brothers be responsible for liability arising out of the violation of any OSHA standards relating or caused by Buyer's design, location, operation or maintenance of product, it its use in association with other equipment of Buyer or alteration of the product.

Cancellation

Any order or contract may be terminated by Buyer only upon written notice and payment of reasonable and proper termination charges, including but not limited to, all costs identified in the order or contract incurred up to the effective date of notice of termination and all charges incurred by Myers Brothers in respect to the termination, plus a fixed sum of 10% of the final net selling price to compensate for disruption in scheduling, planned production and other indirect costs.

Assignment

Any assignment of this Agreement or any rights or obligations under this Agreement without the express written approval of Myers Brothers shall be void and of no effect.

Understanding

This Agreement and Myers Brothers final proposal reflects all understanding, representations, conditions and warranties between Myers Brothers and Buyer.

Arbitration

All disputes that may arise between Myers Brothers and Buyer regarding the interpretation or application of this contract and the legal effect of this contract shall, to the exclusion of any court of law, be arbitrated and determined by a board of arbitrators, unless the parties can resolve the dispute by mutual agreement. Either party shall have the right to submit any dispute to arbitration 30 days after the other party has been notified as to the nature of the dispute. If the dispute goes to arbitration, each party shall select an arbitrator and the two arbitrators so selected shall jointly select a third arbitrator. The arbitration shall be governed by the rules of the American Arbitration Association. The statutes of the city of Kansas City Missouri shall govern the arbitration proceeding, and the proceeding shall be held in the city

and state where the principal office of the Buyer is located. Anything to the contrary contained in the above mentioned rules and statutes not-withstanding, the parties consent that any papers, notices, or process necessary or proper for the institution or continuance of, or relating to any arbitration proceeding, or for the confirmation of an award and entry of judgment on any award made, including appeals in connection with any judgment or award, may be served on each of the parties by registered mail addressed to the party at the principal office of that party, or by personal service on the party in or without the above mentioned state. The parties recognize and consent to the above mentioned arbitration association's jurisdiction over each and every one of them.

Your Proposal is accepted this _____day of_____ 20___,

Buyer: _____
By: _____
Title: _____
Witness: _____

To avoid misunderstanding, please initial and return drawing [s] [if included] and Proposal to address indicated.

Myers Brothers appreciates the opportunity to be of service to you and your company. Contact me with any questions or comments.

Best regards,

Gregory Davis
Industrial Sales Manager

SECTION 01 57 20 - EROSION CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Installation of temporary water pollution control measures to prevent discharge of pollutants such as chemicals, fuels, lubricants, bitumen, raw sewage, or other harmful material from the project.

B. Drawings and general provisions of Contract, including General and Special Provisions, apply to this section.

1.2 GENERAL

A. The Contractor shall manage his operations to control water pollution in accordance with this specification and applicable State regulations. Construction of permanent drainage facilities and other contract work, contributing to control of erosion, shall be scheduled at the earliest practicable time.

B. The Contractor shall furnish, install, maintain, and remove temporary erosion control measures. The Contractor shall prevent silt or polluted storm water discharge from the site.

C. The Owner's Representative may require installation of additional erosion control facilities, by the Contractor, if in the sole opinion of the Owner's Representative; the Contractor's efforts are inadequate.

D. The Contractor shall be responsible for providing additional erosion control measures as needed in the event that unforeseen erosion problems arise or if construction deviates from the construction plans.

E. Erosion control measures shall follow the details of the American Public Works Association, Kansas City Metropolitan Chapter, or as approved by the Owner's Representative.

1.3 DEFINITIONS

A. Temporary Berm: A temporary ridge of compacted soil, with or without a shallow ditch, constructed at the top of slopes or transverse to the centerline of a slope. The berm diverts storm runoff to temporary outlets to discharge water with minimal erosion.

B. Temporary Slope Drain: A temporary facility used to carry water down a slope.

C. Ditch Check: An obstruction placed at frequent intervals across ditches, creating small ponds to cause sediment to settle and be contained.

D. Straw Bales: Standard agricultural bales used to filter the flow of water trap, deposit sediment, and/or divert water.

E. Silt Fence: A geotextile barrier fence to contain sediment by removing suspended particles from water passing through the fence.

F. Sediment Removal: Removal of accumulated sediment to restore the efficiency of sediment control features.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Ditch Checks:

1. Rock ditch checks: 2" to 3" clean gravel or limestone.
2. Straw bale ditch checks: Rectangular wheat straw bales in good condition. Other foliage may be substituted for straw in accordance with MoDOT 802.2.1.

3. Silt fence ditch checks: Geotextile meeting the requirements of this specification.

B. Riprap for Temporary Erosion Control: Type 1 Rock Blanket conforming to MoDOT 611.32.

C. Wire Supported and Self Supporting Silt Fence:

D. Geotextile Fabric

1. Fibers used in geotextiles shall consist of longchain synthetic polymers, composed of at least 85 percent by weight polyolefins, polyesters, or polyamides. They shall be formed into a network such that the filaments or yarns retain dimensional stability relative to each other, including selvages.
2. The geotextile shall be free of any treatment or coating which might adversely alter its physical properties after installation.
3. Geotextile shall be furnished in 36" width rolls.
4. Geotextile rolls shall be furnished with suitable wrapping for protection against moisture and extended ultraviolet exposure.
5. Each roll shall be labeled or tagged to provide product identification sufficient for inventory.
6. Rolls shall be stored in a manner, which protects them from the elements.
7. Geotextile shall conform to the following:

TABLE 1

PHYSICAL REQUIREMENTS[1] FOR

TEMPORARY SILT FENCE GEOTEXTILES

Property	Test Method	Wire Fence Supported Requirements	Self Supported Requirements
Tensile Strength, Lbs.	ASTM D4632	90 Minimum[2]	90 Minimum[2]
Elongation at 50% Minimum tensile strength(45 Lbs.)	ASTM D4632	N/A	50 Maximum
Filtering Efficiency, %	VTM-51[3]	75	75
Flow Rate gal/ft/min	VTM-51[3]	0.3	0.3
Ultraviolet Degradation at 500 hrs.	ASTM D4355	Minimum 70% Strength Retained	Minimum 70% Strength Retained

Notes: 1. All numerical values represent minimum average roll value.
2. When tested in any principal direction.
3. Virginia DOT test method.

E. Posts: Wood, steel, or synthetic posts may be used. Posts shall have a minimum length of 48”. Posts shall have sufficient strength to resist damage during installation and to support applied loads.

F. Support Fence: Wire or other support fence shall be at least 24" high and strong enough to support applied loads.

G. Prefabricated Fence: Prefabricated fence systems may be used provided they meet all of the above material requirements.

2.2 CERTIFICATION AND SAMPLING:

A. The Contractor shall furnish a manufacturer’s certification, stating the material conforms to the requirements of these specifications.

B. The certification shall include, or have attached, typical results of tests for the specified properties, representative of the materials supplied.

C. The Owner's Representative reserves the right to sample and test any material offered for use.

PART 3 - EXECUTION

3.1 GENERAL REQUIREMENTS

A. The Owner's Representative may limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, or fill operations.

B. The Owner's Representative may direct the Contractor to provide immediate permanent or temporary pollution control measures to prevent contamination of adjacent streams, other watercourses, lakes, ponds, or other areas of water impoundment. Work may involve the construction of temporary berms, dikes, dams, sediment basins, slope drains, use of temporary mulches, seeding or other control devices or methods to control erosion.

C. The Contractor shall incorporate permanent erosion control features at the earliest practicable time.

D. The Contractor at no additional cost shall provide temporary pollution control measures needed to control erosion during normal construction practices to the Owner.

E. The Contractor shall be responsible for maintaining erosion control devices and removing sediment until temporary vegetation has become established.

3.2 LIMITATION OF AREA DISTURBED:

A. The Contractor's operations shall be scheduled to install permanent erosion control features immediately after clearing and grubbing, and grading.

B. The Owner's Representative may limit the area of clearing and grubbing, excavation, borrow, and embankment operations commensurate with the Contractor's capability and progress in completing the finish grading, mulching, seeding, and other such permanent pollution control measures current.

C. The Contractor shall respond to seasonal variations. If required by weather, temporary erosion control measures shall be taken immediately.

3.3 BORROW AND WASTE AREAS

A. Material pits other than commercially operated sources and material spoil areas shall be subject to pollution control measures of this specification. An offsite location does not relieve the Contractor of his contractual obligation to prevent the introduction of silt or other pollutants into receiving waterways.

3.4 CONFLICT WITH FEDERAL, STATE OR LOCAL LAWS, RULES OR REGULATIONS

A. In case of conflict between these requirements and pollution control laws, rules, or regulations or other Federal, State or local agencies, the more restrictive laws, rules, or regulations shall apply.

3.5 TEMPORARY BERMS

A. Temporary berms shall be constructed at the top of newly constructed slopes and / or transverse to grade to divert runoff and prevent erosion until permanent controls are installed and / or slopes are stabilized. Two types of temporary berms will be utilized under conditions listed below:

1. Type "A" Berm: At the end of each day's operations on embankments.
2. Type "B" Berm: At shut down of embankment operations for the winter season or discontinuation of work at the direction of, or with concurrence of the Owner's Representative.

B. Interceptor berms transverse to centerline may be used when temporary berms are installed on grades in excess of 1 percent and at locations where water is to be carried down the fill slope by temporary or permanent slope drains.

C. Construction Requirements:

1. Type A Berms shall be constructed to the approximate dimensions indicated on the typical drawing at the end of this section. Berms shall be machine compacted with a minimum of one pass over the entire width with a bulldozer tread, grader wheel, or other approved method.
2. Type “B” Berms shall be constructed to the approximate dimensions indicated on the drawings. These berms shall be machine compacted with a minimum of three passes over the entire width with a bulldozer tread, grader wheel, or other approved method.
3. Type “A” and Type “B” Berms must drain to a compacted outlet at a slope drain. The top width of these berms may be wider and the side slopes flatter on transverse berms to allow equipment to pass over these berms with a minimal disruption.

3.6 DITCH CHECKS

A. General:

1. Rock ditch checks may be used on ditches with grades of 4 percent or less.
2. Straw bale ditch checks may be used on all ditches.
3. The silt fence fabric may be eliminated for grades of 2 percent or less.
4. Silt fence ditch check may be used on all ditches.
5. A straw bale ditch check or a silt fence ditch check may be used in lieu of a sediment basin for drainage areas less than two acres. The basin shall have a volume of 1,815 CF per acre of contributing drainage area.

B. Construction Requirements:

1. Rock ditch checks shall be constructed in accordance with the detail at the end of this section.
2. Achieve complete coverage of the ditch or swale and insure the center of the check is lower than the edges.
3. Straw bale ditch checks shall be constructed in accordance with the detail at the end of this section.
4. Silt fence ditch checks shall be constructed in accordance with the detail at the end of this section.

C. Maintenance:

1. Ditch checks shall be checked for sediment accumulation after each rainfall.
2. Sediment shall be removed when it reaches one-half of the original height.
3. Regular inspections shall be made to insure that the center of a rock check is lower than the edges. Erosion caused by high flows around the edges of the check shall be corrected immediately.

3.7 STRAW BALES

A. General

1. Install at the bottom of embankment slopes less than 10' high to divert runoff from sheet flow and intercept some of the sediment in the sheet flow.
2. Install as ditch checks in small ditches and drainage areas.
3. Install on the lower side of cleared areas to catch sediment from sheet flow.
4. Install around an inlet to prevent sediment from entering the enclosed pipe system.

B. Construction Requirements:

1. Bales of straw shall be utilized to control erosion, trap sediment, and divert runoff.
2. Bales must be adequately braced from behind.

3.8 SILT FENCE

A. General

1. Install along the toe of fills over 10' in height, along the right-of-way line, parallel to streams or around an inlet to prevent sediment from entering the pipe system.

B. General Requirements:

1. The Contractor shall install a temporary silt fence in locations shown on the drawings, around inlets that accept flows containing silt, and other locations necessary to prevent the discharge of silt from the site.
2. Installation shall conform to the detail at the end of this section.
3. Fence construction shall be adequate to handle the stress from hydraulic and sediment loading.

C. Installation

1. Geotextile at the bottom of the fence shall be embedded a minimum of 6” into the ground..
2. The trench shall be backfilled and the soil compacted over the geotextile. The geotextile shall be spliced together as indicated on the detail.
3. Post Installation

a. Post spacing shall not exceed 4’ maximum on center unless otherwise recommended by the manufacturer.
b. Posts shall be driven a minimum of 18”into the ground. Where rock is encountered, posts shall be installed in a manner approved by the Owner’s Representative.
c. Closer spacing, greater embedment depth and/or wider posts shall be used in low areas, soft, or swampy ground to ensure adequate resistance to applied loads.

4. When support fence is used, the mesh shall be fastened securely to the upstream side of the post.

a. The mesh shall extend into the trench a minimum of 2" and extend a maximum of 36" above the original ground surface.

5. When self-supported fence is used, the geotextile shall be securely fastened to fence posts.

D. Maintenance

1. The Contractor shall maintain the integrity of silt fences as long as they are necessary to contain sediment runoff.
2. The Contractor shall inspect all temporary silt fences immediately after each rainfall and at least daily during prolonged rainfall.
3. The Contractor shall immediately correct deficiencies.
4. The Contractor shall make a daily review of the location of silt fences in areas where construction activities have changed the natural contour and drainage runoff to ensure that the silt fences are properly located for effectiveness.
5. Where a single fence is not adequate to handle the volume of silt or flows are not completely intercepted, additional silt fences shall be installed.
6. The Contractor shall remove and dispose of sediment deposits when the deposit approaches one-half the height of the fence.
7. The silt fence shall remain in place until the upstream surface is stabilized. Upon removal, the Contractor shall remove the silt fence, dispose of excess silt, and restore the disturbed area.

3.9 SEDIMENT REMOVAL

A. General

1. Sediment deposits shall be removed when:

a. The deposits reach approximately one-half the height of a ditch check, straw bale barrier or silt fence.
b. The sediments have reduced the ponded volume of sediment basins to one-third of the original volume.
c. Requested by the Owner’s Representative.

B. Sediment removed from erosion control features shall be deposited in a location where it will not erode into construction areas or watercourses.

END OF SECTION 015720

SECTION 01 23 00 - ALTERNATES

1.1 SCHEDULE OF ALTERNATES

A. Alternate No. 1: Parking Lot
   1. Base Bid: Provide mill and overlay only where required for building addition.
   2. Alternate: Mill and overlay entire High Technology parking lot.

B. Alternate No. 2: Level 2 Air Handling Unit
   1. Base Bid: Replace cooling coil only along with linesets and DX unit as shown on Mechanical Drawings.
   2. Alternate: Replace air handling unit in its entirety with new unit.

C. Alternate No. 3: Classroom Renovation
   1. Base Bid: No work on Level 2 except for air handling unit.
   2. Alternate: Renovate Level 2 Classroom into two separate rooms as shown on A101 and associated drawings.

D. Alternate No. 4: Existing High Bay Lab Paint
   1. Base Bid: Existing overhead finish to remain.
   2. Alternate: Paint existing exposed roof structure using same dry-fall system as new addition.

E. Alternate No. 5: Existing High Bay Lab Lighting
   1. Base Bid: Existing light fixtures to remain.
   2. Alternate: Install new light fixtures throughout high-bay space in current fixture locations, using fixture specified for addition.

F. Alternate No. 6: South Building Façade
   1. Base Bid: Existing façade to remain.
   2. Alternate: Replace all existing insulating metal panels on south façade with panels to match those used at addition. Include all flashing and trim. Include price for four (4) wall pack fixtures and wiring. Include removal and replacement in-kind of man-doors.

END OF SECTION 01 23 00

SUBSTITUTION REQUEST AFTER AWARD OF CONTRACT

Date: _____ Project: _____

To: _____ Contractors Substitution Request Number: _____

Specification Section Number: _____ Specification Section Title: _____

Specification Section Page: _____ Specification Article / Paragraph: _____

Proposed Substitution: _____

_____

Manufacturer: _____

Trade Name: _____ Model No: _____

Installer: _____ Contact Telephone Number: _____

History: ☐ New Product. ☐ 1 – 4 years old. ☐ 5 – 10 years old. ☐ More than 10 years old.

Differences between proposed substitution and specified product: _____

_____

_____

☐ Point by point comparative data attached – Required by A/E.

Reason for not providing specified item: _____

_____

Similar Installation:

Project: _____ Architect: _____

Address: _____ Owner: _____

_____ Date Installed: _____

Proposed substitution affects other parts of Work: ☐ No. ☐ Yes; explain. _____

_____

Savings to Owner for accepting substitution: $ _____

Proposed substitution changes Contract Time: ☐ No. ☐ Yes; [Add] [Deduct] _____ days.

Supporting Data Attached: ☐ Product Description. ☐ Specifications. ☐ Drawings. ☐ Photographs. ☐ Performance & Test Data. ☐ Other

The undersigned certifies:

  - Proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitutions will be complete in all respects.

Submitted by:_____ Signed by:_____

Firm:_____

Address:_____

Telephone:_____

Consultant Review and Recommendation:

☐ Substitution Approved.

☐ Substitution Approved as Noted.

☐ Substitution Rejected.

☐ Substitution Request received too late.

Signed By:_____ Date:_____

Architect Review and Action:

☐ Substitution Approved.

☐ Substitution Approved as Noted.

☐ Substitution Rejected.

☐ Substitution Request received too late.

Signed By:_____ Date:_____

Additional Comments: ☐ Contractor. ☐ Subcontractor. ☐ Supplier. ☐ Manufacturer. ☐ A/E ☐ _____

PROCUREMENT SUBSTITUTION REQUEST DURING BIDDING / NEGOTIATION PERIOD

Date:_____ Project: _____

To:_____ Contractor/Sub Contractor Name:_____

Specification Section Number:_____ Specification Section Title:_____

Specification Section Page:_____ Specification Article / Paragraph:_____

Proposed Substitution:_____

_____

Manufacturer:_____

Trade Name:_____ Model No:_____

Indicate 3 Location(s) where the proposed substituted product has been used locally or regionally

Project Name:_____

Project Address:_____

Project Contact Name and Phone Number:_____

Architect Contact Name and Phone Number:_____

Project Name:_____

Project Address:_____

Project Contact Name and Phone Number:_____

Architect Contact Name and Phone Number:_____

Project Name:_____

Project Address:_____

Project Contact Name and Phone Number:_____

Architect Contact Name and Phone Number:_____

Attached data includes product description, specifications, drawings, photographs, and performance & test data adequate for evaluation of the request; applicable portions of the data are clearly indicated

Attached data also includes a description of the changes to the Contract Documents that the proposed substitution will require for its proper installation.

The undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to the specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Coordination, installation, and changes in the Work as necessary for accepted substitutions will be complete in all respects.

Submitted by:_____ Signed by:_____

Firm:_____

Address:_____

Telephone:_____

Supporting Data Attached: ☐ Product Description. ☐ Specifications. ☐ Drawings. ☐ Photographs. ☐ Performance & Test Data. ☐ Other

Consultant Review and Recommendation:

☐ Substitution Approved.
☐ Substitution Approved as Noted.
☐ Substitution Rejected.
☐ Substitution Request received too late.

Signed By:_____ Date:_____

Architect Review and Action:

☐ Substitution Approved.
☐ Substitution Approved as Noted.
☐ Substitution Rejected.
☐ Substitution Request received too late.

Signed By:_____ Date:_____

SECTION 02 41 19 - SELECTIVE DEMOLITION

1.1 INFORMATIONAL SUBMITTALS
- A. Predemolition Photographs or Video: Submit before Work begins.

1.2 FIELD CONDITIONS
- A. Owner will occupy portions of building adjacent to selective demolition area.
- B. Hazardous Materials: Removed by Owner prior to start of the Work.
  1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- C. Historic removal or dismantling required.

1.3 WARRANTY
- A. Existing Warranties: Roof repairs performed in 2019 warranted through 2028.

1.4 EXAMINATION
- A. Perform an engineering survey of condition of building.

1.5 PREPARATION
- A. Refrigerant: Remove according to 40 CFR 82.

1.6 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS
- A. Utility Shut Off: By Contractor.

1.7 DISPOSAL OF DEMOLISHED MATERIALS
- A. Dispose of according to Section 01 00 00 "General Requirements."

1.8 SELECTIVE DEMOLITION SCHEDULE
- A. Refer to Sheets D100 and D101.

END OF SECTION 02 41 19

SECTION 031000 - CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Form-facing material for cast-in-place concrete.
2. Shoring, bracing, and anchoring.

B. Related Requirements:

1. Section 321313 "Concrete Paving" for formwork related to concrete pavement and walks.

1.3 DEFINITIONS

A. Form-Facing Material: Temporary structure or mold for the support of concrete while the concrete is setting and gaining sufficient strength to be self-supporting.

B. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction, movement, contraction, and isolation joints
c. Forms and form-removal limitations.
d. Shoring and reshoring procedures.
e. Anchor rod and anchorage device installation tolerances.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following:

1. Exposed surface form-facing material.
2. Concealed surface form-facing material.
3. Forms for cylindrical columns.
4. Void forms.
5. Form ties.
6. Waterstops.
7. Form-release agent.

1.6 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

B. Minutes of preinstallation conference.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Concrete Formwork: Design, engineer, erect, shore, brace, and maintain formwork, shores, and reshores in accordance with ACI 301 (ACI 301M), to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads, so that resulting concrete conforms to the required shapes, lines, and dimensions.

1. Design wood panel forms in accordance with APA's "Concrete Forming Design/Construction Guide."
2. Design formwork to limit deflection of form-facing material to 1/240 of center-to-center spacing of supports.

2.2 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. Plywood, metal, or other approved panel materials.

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.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class.

1. Provide forms with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.

D. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

2.3 WATERSTOPS

A. 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).

2.4 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. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.

D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

E. 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.

F. 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-1.0: ACI 117 Class D, 1 inch (25 mm).
2. Surface Finish-2.0: ACI 117 Class B, 1/4 inch (6 mm).
3. Surface Finish-3.0: ACI 117 Class A, 1/8 inch (3.0 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. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
3. Install keyways, reglets, recesses, and other accessories, for easy removal.

F. Do not use rust-stained, steel, form-facing material.

G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces.

1. Provide and secure units to support screed strips
2. Use strike-off templates or compacting-type screeds.

H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible.

1. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar.
2. Locate temporary openings in forms at inconspicuous locations.

I. Chamfer exterior corners and edges of permanently exposed concrete.

J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches (305 mm).

K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work.

1. Determine sizes and locations from trades providing such items.
2. Obtain written approval of Architect prior to forming openings not indicated on Drawings.

L. 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. 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 as indicated on Drawings and at a minimum of 15’.

a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

M. Provide temporary ports or openings in formwork where required to facilitate cleaning and inspection.

1. Locate ports and openings in bottom of vertical forms, in inconspicuous location, to allow flushing water to drain.
2. Close temporary ports and openings with tight-fitting panels, flush with inside face of form, and neatly fitted, so joints will not be apparent in exposed concrete surfaces.

N. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

O. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

P. 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. Install dovetail anchor slots in concrete structures, as indicated on Drawings.
5. Clean embedded items immediately prior to concrete placement.

3.3 INSTALLATION OF WATERSTOPS

A. 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 REMOVING AND REUSING FORMS

A. Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

B. Clean and repair surfaces of forms to be reused in the Work.

1. Split, frayed, delaminated, or otherwise damaged form-facing material are unacceptable for exposed surfaces.
2. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints.

1. Align and secure joints to avoid offsets.
2. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.5 SHORING AND RESHORING INSTALLATION

A. Comply with ACI 318 (ACI 318M) and ACI 301 (ACI 301M) for design, installation, and removal of shoring and reshoring.

B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Inspect formwork for shape, location, and dimensions of the concrete member being formed.
2. Inspect insulating concrete forms for shape, location, and dimensions of the concrete member being formed.

END OF SECTION 031000

SECTION 032000 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Steel reinforcement bars.
2. Welded-wire reinforcement.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction contraction and isolation joints.
c. Steel-reinforcement installation.

1.4 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.
2. Epoxy repair coating.
3. Bar supports.
4. Mechanical splice couplers.

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, details of mechanical splice couplers, details of welding 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 the Architect.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Statements: For testing and inspection agency.

B. Welding certificates.

1. Reinforcement To Be Welded: Welding procedure specification in accordance with AWS D1.4/D1.4M

C. Material Certificates: For each of the following, signed by manufacturers:

1. Epoxy-Coated Reinforcement: CRSI's "Epoxy Coating Plant Certification."

D. 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.

2. Mechanical splice couplers.

E. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4/D 1.4M.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. and to avoid damaging coatings on steel reinforcement.

1. Store reinforcement to avoid contact with earth.
2. Do not allow epoxy-coated reinforcement to be stored outdoors for more than 60 days without being stored under an opaque covering.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Reinforcing Bars: ASTM A615/A615M, Grade 60 (Grade 420), deformed.

C. Low-Alloy Steel Reinforcing Bars: ASTM A706/A706M, deformed.

D. Headed-Steel Reinforcing Bars: ASTM A970/A970M.

E. Epoxy-Coated Reinforcing Bars:

1. Steel Bars: ASTM A615/A615M, Grade 60 (Grade 420), deformed bars.
2. Epoxy Coating: ASTM A775/A775M or ASTM A934/A934M with less than 2 percent damaged coating in each 12-inch (305-mm) bar length.

F. Steel Bar Mats: ASTM A184/A184M, fabricated from ASTM A615/A615M, Grade 60 (Grade 420), deformed bars, assembled with clips.

G. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

H. Deformed-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, flat sheet.

2.2 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615/A615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.

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. For epoxy-coated reinforcement, use CRSI Class 1A epoxy-coated or other dielectric-polymer-coated wire bar supports.

C. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch (1.2908 mm) in diameter.

1. Finish: Plain, except for epoxy bar ASTM A884/A884M, Class A, Type 1, epoxy coated, with less than 2 percent damaged coating in each 12-inch (305-mm) wire length.

D. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A775/A775M.

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. Provide concrete coverage in accordance with ACI 318 (ACI 318M).

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Splices: Lap splices as indicated on Drawings.

1. Bars indicated to be continuous, and all vertical bars shall 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).
3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
4. Weld reinforcing bars in accordance with AWS D1.4/D 1.4M, where indicated on Drawings.

F. Install welded-wire reinforcement in longest practicable lengths.

1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."

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.

G. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating in accordance with ASTM D3963/D3963M.

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. Do not continue reinforcement through sides of strip placements of floors and slabs.

B. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length, to prevent concrete bonding to one side of joint.

3.4 INSTALLATION TOLERANCES

A. Comply with ACI 117 (ACI 117M).

3.5 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel-reinforcement placement.
2. Steel-reinforcement mechanical splice couplers.
3. Steel-reinforcement welding.

END OF SECTION 032000

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

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, concrete forms, and waterstops.
2. Section 032000 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
3. Section 071900 "Water Repellents" for curing and sealing restrictions for floor coatings.
4. Section 312000 "Earth Moving" for drainage fill under slabs-on-ground.
5. Section 321313 "Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.
b. Ready-mix concrete manufacturer.
c. Concrete Subcontractor.

2. Review the following:

a. Special inspection and testing and inspecting agency procedures for field quality control.
b. Construction joints, control joints, isolation joints, and joint-filler strips.
c. Semirigid joint fillers.
d. Vapor-retarder installation.
e. Anchor rod and anchorage device installation tolerances.
f. Cold and hot weather concreting procedures.

g. Concrete finishes and finishing.
h. Curing procedures.
i. Forms and form-removal limitations.
j. Shoring and reshoring procedures.
k. Methods for achieving specified floor and slab flatness and levelness.
l. Floor and slab flatness and levelness measurements.
m. Concrete repair procedures.
n. Concrete protection.
o. Initial curing and field curing of field test cylinders (ASTM C31/C31M.)
p. Protection of field cured field test cylinders.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Silica fume.
5. Aggregates.
6. 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.

7. Color pigments.
8. Vapor retarders.
9. Liquid floor treatments.
10. Curing materials.

a. Include documentation from color pigment manufacturer, indicating that proposed methods of curing are recommended by color pigment manufacturer.

11. Joint fillers.
12. Repair materials.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Slump limit.
6. Air content.
7. Nominal maximum aggregate size.
8. Intended placement method.
9. 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.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Final finish for floors.
6. Curing process.
7. Floor treatment if any.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer: Include copies of applicable ACI certificates.
2. Ready-mixed concrete manufacturer.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Bonding agents.
5. Adhesives.
6. Vapor retarders.
7. Semirigid joint filler.
8. Joint-filler strips.
9. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Silica fume.
6. Aggregates.
7. Admixtures:

a. Permeability-Reducing Admixture: Include independent test reports, indicating compliance with specified requirements, including dosage rate used in test.

D. Floor surface flatness and levelness measurements report, indicating compliance with specified tolerances.

E. Minutes of preinstallation conference.

1.7 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."

B. Laboratory Testing Agency Qualifications: A testing agency qualified in accordance with ASTM C1077 and ASTM E329 for testing indicated and employing an ACI-certified Concrete Quality Control Technical Manager.

1. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

1.8 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.
f. Permeability.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).

1.10 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 306.1 and as follows.

1. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
2. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301 (ACI 301M).
3. Do not use frozen materials or materials containing ice or snow.
4. Do not place concrete in contact with surfaces less than 35 deg F (1.7 deg C), other than reinforcing steel.
5. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M), and as follows:

1. Maintain concrete temperature at time of discharge to not exceed 95 deg F (35 deg C).
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with ACI 301 (ACI 301M)unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
3. Obtain aggregate from single source.
4. Obtain each type of admixture from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C150/C150M, Type I/II, gray.
2. Fly Ash: ASTM C618, Class C or F.
3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.

C. Normal-Weight Aggregates: ASTM C33/C33M, Class 5S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:

   a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
   b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
   c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. (2.37 kg/cu. m) for moderately reactive aggregate or 3 lb./cu. yd. (1.78 kg/cu. m) for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301 (ACI 301M).

2. Maximum Coarse-Aggregate Size: 1 inch (25 mm) at slab-on-grade and 3/4 inch (19 mm) at other locations nominal.
3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Air-Entraining Admixture: ASTM C260/C260M.

E. 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.

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.

7. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

F. Water and Water Used to Make Ice: ASTM C94/C94M, potable orcomplying with ASTM C1602/C1602M, including all limits listed in Table 2 and the requirements of paragraph 5.4

2.3 VAPOR RETARDERS

A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A, with a maximum water-vapor permeance of 0.008 grains/h x sq. ft. x inches Hg; ASTM E 96. Furnish manufacturer’s accessories including bonding asphalt or pressure-sensitive tape, pointing mastics and self-adhering joint tape.

1. Products:

a. Raven Industries, Inc.; Vapor Block 15
b. Reef Industries, Inc.; Griffolyn 15 mi Green
c. Stego Industries, LLC.; Stego Wrap Vapor Barrier (15mil)
d. W.R. Meadows, Inc.; Perminator (15 mil)

2.4 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or siliconate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ChemMasters, Inc; Chemisil Plus.
b. ChemTec International; ChemTec One.
c. Curecrete Distribution Inc.; Ashford Formula.
d. Dayton Superior; Sure Hard Densifer J17.
e. Euclid Chemical Company (The); an RPM company; Euco Diamond Hard.
f. Kaufman Products, Inc; SureHard.
g. Laticrete International, Inc.; L&M Seal Hard.
h. Nox-Crete Products Group; Duro-Nox.
i. US SPEC, Division of US MIX Company; Permalith.
j. Vexcon Chemicals Inc.; Vexcon StarSeal PS Clear.
k. W.R. Meadows, Inc; Liqui-Hard.

2.5 CURING MATERIALS (CP2)

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Corporation; MasterKure ER 50.
b. ChemMasters, Inc; Spray-Film.
c. Laticrete International, Inc.; L&M E-CON.

B. 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.

C. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.

1. Color:

a. Ambient Temperature Below 50 deg F (10 deg C): Black.
b. Ambient Temperature between 50 deg F (10 deg C) and 85 deg F (29 deg C): Any color.
c. Ambient Temperature Above 85 deg F (29 deg C): White.

D. Water: Potable or complying with ASTM C1602/C1602M.

E. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A and B, nondissipating, 30% solids .

1. Products: Subject to compliance with requirements, provide one of the following:

a. BASF Corporation – Building Systems.
b. ChemMasters, Inc; Polyseal WB.
c. Dayton Superior; Conspec.
d. Dayton Superior; Edoco.

e. Euclid Chemical Company (The); an RPM company; Super Diamond Clear VOX.
f. Laticrete International, Inc.; L&M Dress & Seal WB 25.
g. W.R. Meadows, Inc; Vocomp-30.
h. Dayton Superior; Symons.

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.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 in accordance with ASTM D2240.

C. Bonding Agent: ASTM C1059/C1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade and class to suit requirements, and as follows:

E. Floor Slab Protective Covering: Eight-feet- (2438-mm-) wide cellulose fabric.

2.7 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3 to 6 mm) or coarse sand, as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested in accordance with ASTM C109/C109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C150/C150M portland cement or hydraulic or blended hydraulic cement, as defined in ASTM C219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested in accordance with ASTM C109/C109M.

2.8 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 or Other Pozzolans: 25 percent by mass.
2. Slag Cement: 20 percent by mass.
3. Total of Fly Ash or Other Pozzolans and Slag Cement: 45 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass and slag cement not exceeding 20 percent by mass.

C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.

1. Use water-reducing, high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and concrete with a w/cm below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures used at truck slab and outdoor porches at 3 gallons DCI per yard.

2.9 CONCRETE MIXTURES

A. Class A: Normal-weight concrete used for footings, grade beams, and tie beams.

1. Exposure Class: ACI 318 (ACI 318M) F2 S0 W1 C1.
2. Minimum Compressive Strength: 4500 psi (31 MPa) at 28 days.
3. Maximum w/cm: 0.45.
4. Slump Limit: 4 inches (100 mm), plus or minus 1 inch (25 mm).
5. Air Content:
6. Exposure Classes F2 and F3: 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch (19-mm) nominal maximum aggregate size.
7. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

B. Class C: Normal-weight concrete used for interior slabs-on-ground.

1. Exposure Class: ACI 318 (ACI 318M) F0 S0 W1 C0.
2. Minimum Compressive Strength: 4000 psi (31 MPa) at 28 days.
3. Maximum w/cm: 0.45.
4. Slump Limit: 8 inches (200 mm), plus or minus 1 inch (25 mm) for concrete with verified slump of 3 inches (75 mm), plus or minus 1 inch (25 mm),before adding high-range water-reducing admixture or plasticizing admixture at Project site.
5. Air Content:
   a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.
6. Limit water-soluble, chloride-ion content in hardened concrete to 0.30 percent by weight of cement.

C. Class D: Normal-weight concrete used for interior slabs-on-ground in areas with vehicle access and/or exterior exposure.

1. Exposure Class: ACI 318 (ACI 318M) F0 S0 W1 C2.
2. Minimum Compressive Strength: 5000 psi (34.5 MPa) at 28 days.
3. Maximum w/cm: 0.40.
4. Slump Limit: 8 inches (200 mm), plus or minus 1 inch (25 mm) for concrete with verified slump of 3 inches (75 mm), plus or minus 1 inch (25 mm),before adding high-range water-reducing admixture or plasticizing admixture at Project site.
5. Air Content:
   a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.
   b. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

D. Class X: Normal-weight concrete used for exterior slab-on-grade.

1. Exposure Class: ACI 318 (ACI 318M) F3 S0 W1 C2.
2. Minimum Compressive Strength: 5000 psi (34.5 MPa) at 28 days.
3. Maximum w/cm: 0.40.
4. Slump Limit: 4 inches (200 mm), plus or minus 1 inch (25 mm).
5. Air Content:
   a. Exposure Classes F2 and F3: 6 percent, plus or minus 1.5 percent at point of delivery for concrete containing 3/4-inch (19-mm) nominal maximum aggregate size.
6. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

2.10 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 EXAMINATION

A. Verification of Conditions:

1. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:

1. Daily access to the Work.
2. Incidental labor and facilities necessary to facilitate tests and inspections.
3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 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.

3.4 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.

3.5 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 per typical details.
3. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
4. Space vertical joints in walls as indicated on Drawings but not to exceed 15 feet. 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 as detailed on drawings and 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. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface, where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
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.

3.6 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.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

C. 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.

D. 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. Slope surfaces uniformly to drains where required.
7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
8. Do not further disturb slab surfaces before starting finishing operations.

3.7 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 or to receive rubbed finish.

B. Rubbed Finish: Apply the following to as cast surface finishes where indicated on Drawings:

1. Smooth-Rubbed Finish:

a. Perform no later than one day after form removal.
b. Moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture.
c. If sufficient cement paste cannot be drawn from the concrete by the rubbing process, use a grout made from the same cementitious materials used in the in-place concrete.

2. Grout-Cleaned Rubbed Finish:

a. Clean concrete surfaces after contiguous surfaces are completed and accessible.
b. Do not clean concrete surfaces as Work progresses.
c. Mix 1 part portland cement to 1-1/2 parts fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
d. Wet concrete surfaces.
e. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap, and keep surface damp by fog spray for at least 36 hours.

3. Cork-Floated Finish:

a. Mix 1 part portland cement to 1 part fine sand, complying with ASTM C144 or ASTM C404, by volume, with sufficient water to produce a mixture with the consistency of thick paint.
b. Mix 1 part portland cement and 1 part fine sand with sufficient water to produce a mixture of stiff grout. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces.
c. Wet concrete surfaces.
d. Compress grout into voids by grinding surface.
e. In a swirling motion, finish surface with a cork float.

C. 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.

3.8 FINISHING FLOORS AND SLABS

A. Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish:

1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch (6 mm) in one direction.
3. Apply scratch finish to surfaces [**to receive concrete floor toppings**] [**to receive mortar setting beds for bonded cementitious floor finishes**] <**Insert locations**>.

C. 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 restraightening 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**] [**and**] [**to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo**] <**Insert locations**>.

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten 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**] <**Insert locations**>.
7. Finish surfaces to the following tolerances, in accordance with ASTM E1155 (ASTM E1155M), for a randomly trafficked floor surface:

    a. Slabs on Ground:
        1) Specified Overall Value (SOV): F_F 50 and F_L 25 with minimum local value (MLV): F_F 40 and F_L 17.

    b. Suspended Slabs:

        1) 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 1/4 inch (6 mm).

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces [**indicated on Drawings**] [**where ceramic or quarry tile is to be installed by either thickset or thinset method**]. While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

1. Coordinate required final finish with Architect before application.
2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and locations indicated on Drawings.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.
2. Coordinate required final finish with Architect before application.

3.9 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.

C. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 4 inches (100 mm) high unless otherwise indicated on Drawings, and extend base not less than 6 inches (150 mm) in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
3. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.

4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
5. Prior to pouring concrete, place and secure anchorage devices.

    a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
    b. Cast anchor-bolt insert into bases.
    c. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.10 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.
3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h (1 kg/sq. m x h), calculated in accordance with ACI 305.1,) before and during finishing operations.

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. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
3. If forms remain during curing period, moist cure after loosening forms.
4. 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.

b. Floors to Receive Penetrating Liquid Floor Treatments: 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.

c. Floors to Receive Polished Finish: 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) 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.

d. Floors to Receive Curing and Sealing Compound:

1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.

2) Recoat areas subjected to heavy rainfall within three hours after initial application.
3) Repeat process 24 hours later, and apply a second coat. Maintain continuity of coating, and repair damage during curing period.

3.11 TOLERANCES

A. Conform to ACI 117 (ACI 117M).

3.12 APPLICATION OF LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than three days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
4. Rinse with water; remove excess material until surface is dry.
5. Apply a second coat in a similar manner if surface is rough or porous.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler in accordance with manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least six month(s).
2. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints.

D. Overfill joint, and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete:

1. Repair and patch defective areas when approved by Architect.
2. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete.

a. Limit cut depth to 3/4 inch (19 mm).
b. Make edges of cuts perpendicular to concrete surface.
c. Clean, dampen with water, and brush-coat holes and voids with bonding agent.

d. Fill and compact with patching mortar before bonding agent has dried.
e. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement, so that, when dry, patching mortar matches surrounding color.

a. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching.
b. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that will affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces:

1. Test unformed surfaces, such as floors and slabs, for finish, and verify surface tolerances specified for each surface.

a. Correct low and high areas.
b. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

2. Repair finished surfaces containing surface defects, including spalls, popouts, honeycombs, rock pockets, crazing, and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
3. After concrete has cured at least 14 days, correct high areas by grinding.
4. Correct localized low areas during, or immediately after, completing surface-finishing operations by cutting out low areas and replacing with patching mortar.

a. Finish repaired areas to blend into adjacent concrete.

5. Correct other low areas scheduled to receive floor coverings with a repair underlayment.

a. Prepare, mix, and apply repair underlayment and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
b. Feather edges to match adjacent floor elevations.

6. Correct other low areas scheduled to remain exposed with repair topping.

a. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations.
b. Prepare, mix, and apply repair topping and primer in accordance with manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.

7. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete.

a. Remove defective areas with clean, square cuts, and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around.
b. Dampen concrete surfaces in contact with patching concrete and apply bonding agent.
c. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate.
d. Place, compact, and finish to blend with adjacent finished concrete.
e. Cure in same manner as adjacent concrete.

8. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar.

a. Groove top of cracks and cut out holes to sound concrete, and clean off dust, dirt, and loose particles.
b. Dampen cleaned concrete surfaces and apply bonding agent.

c. Place patching mortar before bonding agent has dried.
d. Compact patching mortar and finish to match adjacent concrete.
e. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 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 shall 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 shall 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 shall 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 shall 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 five 4-inch (100 mm) by 8-inch (200 mm) cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C39/C39M.

    a. Test one cylinder at seven days, two specimens at 28 days and one at 56 days for record.
    b. A compressive-strength test shall be the average compressive strength from a set of three specimens obtained from same composite sample and tested at age indicated.

7. 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).
8. 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.
9. Additional Tests:

    a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
    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 shall be in accordance with ACI 301 (ACI 301M), section 1.6.6.3.

10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

F. Measure floor and slab flatness and levelness in accordance with ASTM E1155 (ASTM E1155M) within 48 hours of completion of floor finishing and promptly report test results to Architect.

3.16 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.
7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 033000

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Shrinkage-resistant grout.

B. Related Requirements:
1. Section 053100 "Steel Decking" for field installation of deck.
2. Section 099100 "Painting" for painting requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303.

1.4 COORDINATION

A. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data:

1. Structural-steel materials.
2. High-strength, bolt-nut-washer assemblies.
3. Anchor rods.
4. Threaded rods.
5. Shrinkage-resistant grout.

B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.

3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Identify members not to be shop primed.

C. Delegated-Design Submittal: For structural-steel connections indicated on Drawings to comply with design loads, include analysis data.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Welding certificates.

C. Mill test reports for structural-steel materials, including chemical and physical properties.

D. Product Test Reports: For the following:

1. Bolts, nuts, and washers, including mechanical properties and chemical analysis.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category 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 CSE.

C. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F3125/F3125M, Grade F1852 bolt assemblies and for retesting bolt assemblies after lubrication.

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. Fabricator's experienced steel detailer shall select or complete connections in accordance with ANSI/AISC 303.

a. Select and complete connections using schematic details indicated and ANSI/AISC 360.
b. Use Allowable Stress Design; data are given at service-load level.

2.2 STRUCTURAL-STEEL MATERIALS

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.

B. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than the following:

1. W-Shapes: 60 percent.
2. Channels, Angles: 60 percent.
3. Plate and Bar: 25 percent.
4. Cold-Formed Hollow Structural Sections: 25 percent.
5. Steel Pipe: 25 percent.

C. W-Shapes: ASTM A992/A992M.

D. Channels, Angles: ASTM A36/A36M.

E. Plate and Bar: ASTM A36/A36M.

F. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade C structural tubing.

G. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.

1. Weight Class: Standard.
2. Finish: Black except where indicated to be galvanized.

H. 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.

B. Zinc-Coated 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.

1. Finish: Hot-dip or mechanically deposited zinc coating.

2.4 RODS

A. Unheaded Anchor Rods: ASTM F1554, Grade 36.

1. Configuration: Straight.
2. Nuts: ASTM A563 (ASTM A563M) heavy-hex carbon steel.
3. Plate Washers: ASTM A36/A36M carbon steel.
4. Washers: ASTM F436 (ASTM F436M), Type 1, hardened carbon steel.
5. Finish: Mechanically deposited zinc coating, ASTM B695, Class 50.

B. Headed Anchor Rods: ASTM F1554, Grade 36, straight.

1. Nuts: ASTM A563 (ASTM A563M) heavy-hex carbon steel.
2. Plate Washers: ASTM A36/A36M carbon steel.
3. Washers: ASTM F436 (ASTM F436M), Type 1, hardened carbon steel.
4. Finish: Mechanically deposited zinc coating, ASTM B695, Class 50.

C. Threaded Rods: ASTM A36/A36M.

1. Nuts: ASTM A63 (ASTM A563M) heavy-hex carbon steel.
2. Washers: ASTM A36/A36M carbon steel.
3. Finish: Plain or as noted.

2.5 PRIMER

A. Steel Primer:

1. Comply with Section 099100 "Painting".

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.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel in accordance with ASTM A6/A6M and maintain markings until structural-steel framing has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.

C. Bolt Holes: Cut, drill, mechanically thermal cut, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted in accordance with SSPC-SP 3.

F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.8 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.

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 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.
6. Surfaces enclosed in interior construction.

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 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 [**or in accordance with SSPC-SP 16**].

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.
1. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

2.10 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 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated on Drawings.

3.3 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- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack 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.

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure. Slope roof framing members to slopes indicated on Drawings.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

3.4 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.

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.
2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.

3.5 REPAIR

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing, and repair galvanizing to comply with ASTM A780/A780M.

1. Cleaning and touchup painting are specified in Section 099100 "Painting”.

3.6 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.

END OF SECTION 051200

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Composite floor deck.

B. Related Requirements:

   1. Section 033000 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
   2. Section 051200 "Structural Steel Framing" for shop- and field-welded shear connectors.
   3. Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
   4. Section 099113 "Exterior Painting" for repair painting of primed deck and finish painting of deck.
   5. Section 099123 "Interior Painting" for repair painting of primed deck and finish painting of deck.

1.3 ACTION SUBMITTALS

A. Shop Drawings:

   1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Product Certificates: For each type of steel deck.

C. Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

   1. Power-actuated mechanical fasteners.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

C. FM Approvals' RoofNav Listing: Provide steel roof deck evaluated by FM Approvals and listed in its "RoofNav" for Class 1 fire rating and Class 1-90 windstorm ratings. Identify materials with FM Approvals Certification markings.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

2.2 COMPOSITE FLOOR DECK

A. B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with SDI RD and with the following:
1. Galvanized Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 33, **G90** zinc coating.
2. Profile Depth: As indicated.
3. Design Uncoated-Steel Thickness: As indicated.
4. Span Condition: Triple span or more.
5. Side Laps: Overlapped.

2.3 ACCESSORIES

A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Galvanizing Repair Paint: ASTM A780/A780M.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

3.3 INSTALLATION OF ROOF DECK

A. A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:

1. Weld Diameter: 5/8 inch (16 mm), nominal.
2. Weld Spacing: Space and locate welds as indicated.

B. B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 18 inches , and as follows:

1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:

1. End Joints: Lapped 2 inches minimum.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels in accordance with deck manufacturer's written instructions. mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

3.4 REPAIR

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint in accordance with ASTM A780/A780M and manufacturer's written instructions.

B. Repair Painting:

1. Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
2. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
3. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
4. Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

C. Prepare test and inspection reports.

END OF SECTION 053100

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

1.1 QUALITY ASSURANCE
- A. Code-compliance certification of studs and tracks by the Steel Stud Manufacturers Association.
- B. Design Loads: As indicated on Drawings.
- C. Fire-Resistance Ratings: As indicated on Drawings.

1.2 PERFORMANCE REQUIREMENTS
- A. Delegated Design: For cold-formed steel framing.

1.3 MATERIALS
- A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, with G60 (Z180) metallic coating.
- B. Interior Non-Load-Bearing Wall Framing: Standard C-shaped, punched steel studs and U-shaped, unpunched track.
  1. Minimum Steel Thickness: 0.0428 inch (1.09 mm).
  2. Single deflection track.
- C. Framing Accessories: Bracing, bridging, and solid blocking.

1.4 INSTALLATION
- A. Fasten framing by welding or screw fastening.
  1. Interior Non-Load-Bearing Wall Stud Spacing: 16 inches (406 mm).

1.5 FIELD QUALITY CONTROL
- A. Testing: By Owner-engaged agency.

END OF SECTION 05 40 00

SECTION 05 50 00 - METAL FABRICATIONS

1.1 PERFORMANCE REQUIREMENTS
- A. Delegated Design: Engineering design of items are not covered on the Structural Drawings but are indicated to comply with design loads, by Contractor.

1.2 MATERIALS
- A. **Steel plates, shapes, and bars; ASTM A 36/A 36M.**
- B. **Stainless steel plates, shapes, and bars:** ASTM A 240/A 240M or ASTM A 666, Type 304.
- C. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- D. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.
- E. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
  1. Size of Channels: 1-5/8 by 1-5/8 inches (41 by 41 mm).
  2. Material: Galvanized steel, ASTM A 653/A 653M, structural steel, Grade 33 (Grade 230), with G90 (Z275) coating; 0.108-inch (2.8-mm) nominal thickness.

1.3 PRODUCTS
- A. Miscellaneous Framing and Supports:
  1. Steel framing and supports for **overhead doors**, **mechanical and electrical equipment, applications where framing and supports are not specified in other Sections**.
- B. Shelf angles at exterior walls.
- C. Metal Floor Plate: Steel.
- D. Miscellaneous Steel Trim: steel edgings.
- E. Metal Bollards: Schedule 80 steel pipe.
  1. Cap bollards with 1/4-inch- (6.4-mm-) thick steel plate.
  2. Installation: Set in steel sleeve inset in concrete slab.
- F. **Pipe** and **Downspout** guards: Steel.
- G. Loose bearing and leveling plates: Steel.
- H. Loose steel lintels at exterior walls.
- I. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts cast into concrete or built into unit masonry.
- J. Steel weld plates and angles not specified in other Sections, for casting into concrete.

1.4 FASTENERS
- A. Fastener Materials: Unless otherwise indicated, provide the following:
  1. Aluminum Items: Type 316 (exterior) stainless steel fasteners.
  2. Stainless-Steel Items: Type 316 stainless-steel fasteners.
  3. Uncoated-Steel Items: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed, Type 316 (exterior) stainless-steel fasteners where exposed.
  4. Galvanized-Steel Items: Plated steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating.
  5. Dissimilar Metals: Type 316 (exterior) stainless-steel fasteners.
- B. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

1.5 FINISHES
- A. Aluminum: High performance coating (two coats) PVDF, AAMA 2605.
- B. Stainless Steel: Directional satin; No. 4.
- C. Steel and Iron: Galvanized.

1.6 FABRICATION
- A. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- 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. Weld corners and seams continuously using 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**].

D. 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.
E. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
G. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

1.7 INSTALLATION

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: 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.
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. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:

END OF SECTION 05 50 00

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

1.1 SUMMARY
- A. Rooftop equipment bases and support curbs.
- B. Wood blocking, cants, and nailers.
- C. Plywood backing panels.
- D. Wood-framed plywood compressor enclosure.

1.2 MATERIALS
- A. Wood Products, General:
  1. Maximum Moisture Content of Lumber: 15 percent.
- B. Wood-Preservative-Treated Materials:
  1. Preservative Treatment: AWPA U1; Use Category UC2/UC3b.
     a. Preservative Chemicals: Containing no arsenic or chromium.
  2. Application: Items indicated and the following:
     a. Items in contact with roofing or waterproofing.
     b. Items in contact with concrete or masonry.
- C. Fire-Retardant-Treated Materials:
  1. Exterior type for exterior locations and where indicated.
  2. Interior Type A, High Temperature (HT) for enclosed roof framing and where indicated.
  3. Interior Type A unless otherwise indicated.
  4. Application: Items indicated and the following:
     a. Concealed blocking.
     b. Items in contact with roofing.
     c. Plywood backing panels.
- D. Miscellaneous Lumber:
  1. Dimension Lumber: Construction or No. 2 grade spruce-pine-fir.
  2. Utility Shelving: 15 percent maximum moisture content.
     a. Spruce-pine-fir, Construction or No. 2 Common.
  3. Concealed Boards: 15 percent maximum moisture content.
     a. Spruce-pine-fir, Construction or 2 Common.
- E. Fasteners: Stainless steel where exposed to weather, in ground contact, in contact with treated wood, or in area of high relative humidity.
- F. Metal Framing Anchors:
  1. Metal: Galvanized steel**; hot-dip heavy galvanized steel for wood-preservative-treated lumber and where indicated; stainless steel for exterior and where indicated**.

1.3 INSTALLATION
- A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- B. 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. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
  3. ICC-ES evaluation report for fastener.
- C. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.

END OF SECTION 06 10 53

SECTION 07 10 00 - WATERPROOFING

1.1 QUALITY ASSURANCE
- A. Source Limitations: Obtain waterproofing system from single source from single manufacturer.

1.2 WARRANTY
- A. Special Warranty: Manufacturer agrees to repair or replace waterproofing and sheet flashings that do not comply with requirements or that fail to remain watertight within specified warranty period.
  1. Warranty Period: Five years from date of Substantial Completion.
- B. Manufacturer's Warranty: Five years for materials only.
- C. Installer's Warranty: Two years.

1.3 COLD FLUID-APPLIED WATERPROOFING
- A. Products:
  1. Carlisle Coatings & Waterproofing Inc; MiraSeal.
  2. GCP Applied Technologies Inc; Procor.
  3. Henry Company; CM100.
  4. Meadows, W. R., Inc.; Hydralastic 836.
  5. Tremco Incorporated; TREMproof 250 GC.
- B. Auxiliary Materials:
  1. Primer: Waterborne.
  2. Sheet Flashing: Uncured neoprene.
  3. Joint Reinforcing Strip: Fiberglass or polyester.
  4. Joint Sealant: Multicomponent polyurethane sealant with closed-cell polyethylene foam backer rod.
  5. Waterstop: Manufacturer’s recommended.
  6. Molded-Sheet Drainage Panels: Molded-plastic drainage core with a nonwoven geotextile facing with polymeric film bonded to second side.
  7. Extruded Polystyrene Board: Type IV, 25 psi (173 kPa).

1.4 PREPARATION
- A. Concrete Substrates: Relative humidity test with in situ probes, ASTM F 2170; maximum 75 percent relative humidity level measurement; additional moisture tests recommended in writing by waterproofing manufacturer. Proceed with installation only after substrates pass testing.
- B. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete with abrasive blasting.
- C. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- D. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.

1.5 INSTALLATION OF COLD FLUID-APPLIED WATERPROOFING
- A. Penetrations, Terminations, and Corners: Prepare, treat, and seal per manufacturer’s recommendations and ASTM C 898/C 898M.
- B. Joints and Cracks: Prepare, treat, rout, and fill per manufacturer’s recommendations and ASTM C 898/C 898M. Embed joint and cover joint reinforcing strip in waterproofing
- C. Sheet Flashing: Extend for 4 inches (100 mm) onto perpendicular surfaces and items penetrating substrate.
- D. Cold Fluid-Applied Waterproofing Unreinforced Application: Dry film thickness of 60 mils (1.5 mm).
- E. Electronic Leak Detection System: Install per manufacturer's written recommendations.

1.6 FIELD QUALITY CONTROL
- A. Testing Agency: Contractor engaged.

END OF SECTION 07 10 00

SECTION 07 21 00 - THERMAL INSULATION

1.1 MATERIALS
- A. Insulation:
  - 1. Sound Attenuation Blanket Insulation: 1.5 pcf.
    - a. Products:
      - 1) CertainTeed; CertaPro AcoustaBlanket Black.
      - 2) Owens Corning; SelectSound.
  - 2. Sound Attenuation Board Insulation
    - a. Products:
      - 1) Rockwool; Rockboard 60
- B. Auxiliary Insulating Materials:
  - 1. Insulation fasteners.
  - 2. Adhesive.

1.2 INSTALLATION
- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.

END OF SECTION 07 21 00

SECTION 07 42 13.23 - METAL COMPOSITE MATERIAL WALL PANELS

1.1 WARRANTY
- A. Special Warranty: Two years.
- B. Finishes: 20 years.

1.2 PERFORMANCE REQUIREMENTS
- A. Structural Performance: ASTM E330.
  1. Wind Loads: As indicated on Drawings.
  2. Other Design Loads: As indicated on Drawings.
  3. Deflection Limits: 1/180.
- B. Air Infiltration: ASTM E283.
- C. Water Penetration: ASTM E331.
- D. Fire-Resistance Rating: ASTM E119 and UL listed.

1.3 PRODUCTS
- A. Metal Composite Material Wall Panels:
  1. Basis-of-Design Product: Subject to compliance with requirements, provide Kingspan KS Series or comparable product by one of the following:
     a. Alcoa Architectural Products
     b. Centria Architectural Systems
     c. Citadel Architectural Products
     d. Firestone Metal Products
     e. Protean Construction Products
  2. Material: Aluminum faced.
  3. Thickness: As indicated on Drawings.
  4. Exterior Finish: Two-coat fluoropolymer, color to be selected by architect from manufacturer’s full range. Two-tone color: dark color on exterior face; light color on interior face.
- B. Attachment Assembly: Manufacturer's standard.

1.4 FABRICATION
- A. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.

1.5 INSTALLATION
- A. As required for attachment assembly.
- B. Fasteners: For aluminum panels use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- C. Flashing and Trim: Install per manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
- D. Installation Tolerances: 1/4 inch in 20 feet (6 mm in 6 m), non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

1.6 FIELD QUALITY CONTROL
- A. Testing: By factory-authorized service representative.

END OF SECTION 07 42 13.23

SECTION 07 52 16 - STYRENE-BUTADIENE-STYRENE (SBS) MODIFIED BITUMINOUS MEMBRANE ROOFING

1.1 WARRANTY
- A. Manufacturer's Materials and Workmanship Warranty: 20 years.
- B. Installer's Warranty: Two years.

1.2 PERFORMANCE REQUIREMENTS
- A. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials demonstrated by roofing manufacturer.
- B. Wind Uplift Resistance:
  1. Zone 1 (Roof Area Field) Uplift Pressure: **26.9 lbf/sq. ft.**
  2. Zone 2a (Roof Area Perimeter) Uplift Pressure: 30.1 **lbf/sq. ft.**
  3. Zone 2b (Roof Area Perimeter) Uplift Pressure: 35.0 **lbf/sq. ft.**
  4. Zone 3a (Roof Area Corner) Uplift Pressure: **38.3 lbf/sq. ft.**
  5. Zone 3b (Roof Area Corner) Uplift Pressure: **51.3 lbf/sq. ft.**
- C. Hail Resistance: SH.
- D. FM Approvals' RoofNav Listing: Class 1A-90.
- E. Exterior Fire-Test Exposure: Class A.

1.3 MATERIALS
- A. Low-emitting adhesives and sealants.
- B. Sheathing paper.
- C. Manufacturers: Provide products by the following:
  1. Garland Company, Inc. (The): Stress Ply Cold-applied 2-ply asphalt roofing.
- D. Base Sheet: ASTM D6164/D6164M, Type I, Grade S.
- E. Interply Sheet: ASTM D2178/D2178M, Type IV.
- F. Cap Sheet: ASTM D6164/D6164M, Type I, Grade S.
- G. Base Flashing Sheet:
  1. Backer Sheet: SBS-modified asphalt sheet, reinforced with a combination of polyester fabric and glass fibers; smooth surfaced.
  2. Flashing Sheet: SBS-modified asphalt sheet, reinforced with a combination of polyester fabric and glass fibers; granule surfaced.
- H. Aggregate Surfacing: Gravel or crushed stone.
- I. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch (13 mm) thick.
- J. Roof Insulation: Polyisocyanurate, ASTM C 1289, Type II, Class 1, Grade 2 board.
  1. Average Coefficient of Heat Transmission of completed Roof Construction Air-to-Air: 0.033 btu per hour, per sq.ft., per deg. F.
  2. Insulation Adhesive: Modified asphaltic, asbestos-free, cold-applied adhesive.
- K. Insulation cant strips.
- L. Tapered edge strips.
- M. Cover Board: Glass-mat, water-resistant gypsum substrate, ASTM C 1177/C 1177M, 1/2 inch (13 mm).
- N. Walkways:
  1. Pads: Reinforced asphaltic composition pads with mineral-granule surface.
  2. Cap Sheet Strips: SBS-modified asphalt sheet, reinforced with a combination of polyester fabric and glass fibers; granule surfaced.

1.4 PREPARATION
- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

1.5 INSTALLATION
- A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- B. Roof Insulation: mechanically fastened.
- C. Roofing System:
  1. Base Sheet: One.
  2. Base Sheet Adhering Method: Cold-applied adhesive.
  3. Number of Interply Sheets: Two.
  4. Cap Sheet Adhering Method: Cold-applied adhesive.

1.6 FIELD QUALITY CONTROL
- A. Testing Agency: Owner engaged.

1. Flood testing.
2. Infrared thermography testing.
3. Electrical capacitance/impedance testing.
4. Low-voltage electrical conductance testing.
5. High-voltage spark testing.

END OF SECTION 07 52 16

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

1.1 WARRANTY
- A. Finish Warranty: 10 years.

1.2 PERFORMANCE REQUIREMENTS
- A. Sheet Metal Standard for Flashing and Trim: SMACNA's "Architectural Sheet Metal Manual".
- B. FM Approvals Listing: For **copings** and **roof edge flashings** for windstorm classification, Class 1-90.

1.3 MATERIALS
- A. Sheet Metals:
  1. Aluminum Sheet: Semigloss fluoropolymer coating system.
- B. Self-adhering, high-temperature sheet: Minimum 30 mils (0.76 mm) thick, slip-resistant polyethylene- or polypropylene-film top surface laminated to butyl- or SBS-modified asphalt adhesive; primer per manufacturer's written recommendations.
  1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
     a. Carlisle Residential, a division of Carlisle Construction Materials; WIP 300HT.
     b. Grace Construction Products, a unit of W. R. Grace & Co.-Conn.; Grace Ice and Water Shield HT.
     c. Henry Company; Blueskin PE200 HT.

1.4 PRODUCTS
- A. Manufactured reglets with counterflashing.
- B. Formed Roof-Drainage Fabrications: Including **hanging gutters** and **downspouts**
  1. Metal: Aluminum.
- C. Formed Low-Slope Roof Fabrications: Including **copings base flashing counterflashing flashing receivers** and **roof-penetration flashing**
  1. Metal: Aluminum.
- D. Formed Wall Fabrications: Including wall expansion-joint cover.
  1. Metal: Stainless steel.
- E. Miscellaneous Formed Fabrications: Including equipment support flashing.
  1. Metal: Stainless steel.

1.5 INSTALLATION
- A. Anchor sheet metal flashing and trim securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
  1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
  2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
  3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
  4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
- B. Corrosion Protection: Protect concealed surfaces of stainless-steel that will be in contact with grout, concrete, masonry, wood, or dissimilar metals with bituminous coating.

END OF SECTION 07 62 00

SECTION 07 92 00 - JOINT SEALANTS

1.1 WARRANTY
- A. Installer Warranty: Two years.
- B. Special Manufacturer's Warranty:
  1. Silicone Sealants: 20 years from date of Substantial Completion.
  2. Urethane Sealants: 5 years from date of Substantial Completion.
  3. Preformed Silicone-Sealant System: 10 years from date of Substantial Completion.

1.2 FIELD QUALITY CONTROL
- A. Preconstruction Field-Adhesion Testing.
- B. Field-Adhesion testing.

1.3 MISCELLANEOUS MATERIALS
- A. Primer: Manufacturer's recommended product.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin)] **Type O (open-cell material) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated**.
- C. Acoustical Outlet Backer: Flexible putty pad which provides high acoustical ratings at outlet boxes in acoustical-rated walls.
  1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
     - a. ATS Acoustics; ATS Acoustics Putty Pads.
     - b. Kinetics Noise Control, Inc.; IsoBacker.

1.4 SCHEDULE
- A. Pourable, Traffic-Grade, Urethane Joint Sealant: Interior joints in horizontal traffic surfaces.
  1. Joint Locations:
     - a. Isolation and contraction joints in cast-in-place concrete slabs.
     - b. Other joints as indicated.
  2.
  3. Multi-Component, Pourable, Traffic-Grade, Urethane Joint Sealant: ASTM C 920, Type M, Grade P, Class 25, for Use T.
     - a. Products: Subject to compliance with requirements, provide one of the following:
       1) BASF Building Systems; MasterSeal SL 2.
       2) Pecora Corporation; NR-200.
       3) Sika Corporation. Construction Products Division; Sikaflex 2c SL.
       4) Tremco Incorporated; 45SSL.
  4. Joint-Sealant Color: As selected by Architect from manufacturer's full range of standard colors.
- B. Low- and Ultra Low-Modulus Silicone Sealant: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
  1. Joint Locations:
     - a. Control and expansion joints in glazed unit masonry.
     - b. Joints between metal panels [with] [fluorpolymer] [and] [high performance coating] [finish].
     - c. Perimeter joints around frames of **doors windows and louvers**.
     - d. Joints between surfaces with high performance coating finish.
     - e. Other joints as indicated.
  2. Low- and Ultra Low-Modulus, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
     - a. Products: Subject to compliance with requirements, provide one of the following:
       1) Dow Corning Corporation; DOWSIL 790.
       2) Momentive Performance Materials, Inc.; GE SilPruf LM SCS2700.
       3) Pecora Corporation; 890NST
       4) Pecora Corporation; 890FTS.
       5) Sika Corporation, Construction Products Division; SikaSil WS 290.
       6) Tremco Incorporated; Spectrem 1.
  3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of standard colors.
- C. Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.
  1. Joint Locations:
     - a. Control and expansion joints on exposed interior surfaces of exterior walls.
     - b. Perimeter joints of exterior openings where indicated.
     - c. Vertical joints on exposed surfaces of walls.
     - d. Perimeter joints between interior wall surfaces and frames of interior doors.
     - e. Penetration perimeter joints.

f. Other joints as indicated.

2. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
   a. Products: Subject to compliance with requirements, provide one of the following:
      1) Momentive Performance Materials, Inc.; RCS20.
      2) Pecora Corporation; AC-20+.
      3) Tremco Incorporated; Tremflex 834.
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of standard colors.

D. Preformed, foam joint seals.
1. Joint Locations:
   a. Building Expansion Joints.
2. Products: Subject to compliance with requirements, provide one of the following:
   a. Dayton Superior Specialty Chemicals; Polytite Standard.
   b. EMSEAL Joint Systems, Ltd.; **Emseal 25V**.
   c. Sandell Manufacturing Co., Inc.; Polyseal.
   d. Schul International, Inc.; Sealtite 50N.
   e. Willseal USA, LLC; Willseal 250.
   f. Tremco Incorporated; illmod 600
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of standard colors.

END OF SECTION 07 92 00

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

1.1 PERFORMANCE REQUIREMENTS
- A. Fire-rated assemblies.
- B. Windborne-debris-impact-resistant doors and frames.

1.2 MANUFACTURERS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Ceco Door Products; an Assa Abloy Group company.
  2. Curries Company; an Assa Abloy Group company.
  3. Steelcraft; an Ingersoll-Rand company.
  4. Steward Steel; Door Division.

1.3 EXTERIOR STANDARD STEEL DOORS AND FRAMES
- A. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2.
  1. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch (1.0 mm).
  2. Edge Construction: Model 2, Seamless.
  3. Core: Polyurethane.
  4. Frames Full profile welded; metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
  5. Exposed Finish: Prime.

1.4 FINISH
- A. Per Section 09 91 00 “Painting.”

1.5 ACCESSORIES
- A. Mullions and transom bars.

1.6 INSTALLATION
- A. Hollow-Metal Frames: Install per SDI A250.11 or NAAMM-HMMA 840.
- B. Metal-Stud Partitions and Concrete Walls: Frames filled with insulation.
- C. Masonry Walls: Grout full.
- D. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.
  1. Non-Fire-Rated Steel Doors:
     - a. Between Door and Frame Jambs and Head: 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).
     - b. Between Edges of Pairs of Doors: 1/8 inch (3.2 mm) to 1/4 inch (6.3 mm) plus or minus 1/32 inch (0.8 mm).
     - c. At Bottom of Door to Top of Threshold or Finished Floor: 3/8 inch maximum.
     - d. Between Door Face and Stop: 1/16 inch (1.6 mm) to 1/8 inch (3.2 mm) plus or minus 1/32 inch (0.8 mm).

END OF SECTION 08 11 13

SECTION 08 36 13 - SECTIONAL DOORS

1.1 RELATED DOCUMENTS
- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY
- A. Section includes motor operated sectional doors.
- B. Related Requirements:
  1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel supports.
  2. Section 09 91 00 "Painting" for finish painting of factory-primed doors.

1.3 ACTION SUBMITTALS
- A. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
  1. Include plans, elevations, sections, and mounting details.
  2. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
  3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
- B. Samples for Verification: For each type of exposed finish on the following components, in manufacturer's standard sizes:
  1. Door sections.

1.4 CLOSEOUT SUBMITTALS
- A. Product Data: For each type and size of sectional door and accessory.
  1. Include construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
- B. Maintenance Data: For sectional doors to include in maintenance manuals.

1.5 QUALITY ASSURANCE
- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.

1.6 MANUFACTURERS, GENERAL
- A. Source Limitations: Obtain sectional doors from single source from single manufacturer.
  1. Obtain operators and controls from sectional door manufacturer.

1.7 PERFORMANCE REQUIREMENTS
- A. General Performance: Sectional doors shall comply with performance requirements specified without failure due to defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.
- B. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.
  1. Design Wind Load: As indicated on Drawings.
  2. Testing: According to ASTM E 330 or DASMA 108 for garage doors and complying with the acceptance criteria of DASMA 108.
  3. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components.
     a. Deflection of door sections in horizontal position (open) shall not exceed 1/120 of the door width.
     b. Deflection of horizontal track assembly shall not exceed 1/240 of the door height.
  4. Operability under Wind Load: Design overhead coiling doors to remain operable under design wind load, acting inward and outward.

1.8 DOOR ASSEMBLY
- A. Aluminum Sectional Door: Sectional door formed with hinged sections and glazed lites and fabricated according to DASMA 102 unless otherwise indicated.
  1. Basis-of-Design Product: Subject to compliance with requirements, provide Overhead Door Corporation; Sectional Aluminum Glass Door Model 521 with ½’ (12mm)_insulated glass or comparable product by one of the following:
     a. Raynor.
     b. Wayne-Dalton Corp.
- B. Operation Cycles: Door components and operators capable of operating for not less than 10,000 cycles. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
- C. Track Configuration: Standard-lift track.
- D. Weatherseals: Fitted to bottom and top and around entire perimeter of door.

E. Roller-Tire Material: Manufacturer's standard.
F. Locking Devices: Equip door with locking device assembly.
   1. Locking Device Assembly: Cremone type, both jamb sides, locking bars, operable from outside only, with cylinder.
G. Counterbalance Type: Manufacturer's standard.
H. Door Finish: Fluoropolymer Coating System to match insulated metal panels.
   1. Factory Prime Finish: Manufacturer's standard color.

1.9 ALUMINUM DOOR SECTIONS

A. Section Ends and Intermediate Stiles: Enclose open ends of sections with channel end stiles formed from galvanized-steel sheet not less than 0.064-inch- (1.63-mm-) nominal coated thickness and welded to door section. Provide intermediate stiles formed from not less than 0.064-inch- (1.63-mm-) thick galvanized-steel sheet, cut to door section profile, and welded in place. Space stiles not more than 48 inches (1219 mm) apart.
B. Reinforce bottom section with a continuous channel or angle conforming to bottom-section profile.
C. Provide reinforcement for hardware attachment.
D. Fabricate sections so finished door assembly is rigid and aligned, with tight hairline joints and free of warp, twist, and deformation.

1.10 TRACKS, SUPPORTS, AND ACCESSORIES

A. Tracks: Manufacturer's standard, galvanized-steel track system of configuration indicated, sized for door size and weight, designed for lift type indicated and clearances indicated on Drawings, Provide complete system including brackets, bracing, and reinforcement to ensure rigid support of ball-bearing roller guides for required door type, size, weight, and loading.
   1. Galvanized Steel: ASTM A 653/A 653M, minimum G60 (Z180) zinc coating.
   2. Track Reinforcement and Supports: Galvanized-steel members to support track without sag, sway, and vibration during opening and closing of doors. Slot vertical sections of track spaced 2 inches (51 mm) apart for door-drop safety device.
      a. For Horizontal Track: Continuous reinforcing angle from curve in track to end of track, attached to track and supported at points by laterally braced attachments to overhead structural members.
B. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom and top of sectional door unless otherwise indicated.

1.11 HARDWARE

A. General: Heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless-steel, or other corrosion-resistant fasteners, to suit door type.
B. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch- (2.01-mm-) nominal coated thickness at each end stile and at each intermediate stile, according to manufacturer's written recommendations for door size. 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 impossible. Provide double-end hinges where required, for doors more than 16 feet (4.88 m) wide unless otherwise recommended by door manufacturer.
C. 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 3-inch- (76-mm-) diameter roller tires for 3-inch- (76-mm-) wide track and 2-inch- (51-mm-) diameter roller tires for 2-inch- (51-mm-) wide track.
D. Push/Pull Handles: Equip each push-up operated or emergency-operated door with galvanized-steel lifting handles on each side of door, finished to match door.

1.12 LOCKING DEVICES

A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded deadbolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
   1. Lock Cylinders: Cylinders specified in Section 08 71 00 "Door Hardware".
   2. Keys: Three for each cylinder.

1.13 COUNTERBALANCE MECHANISM

A. Torsion Spring: Counterbalance mechanism consisting of adjustable-tension torsion springs fabricated from steel-spring wire complying with ASTM A 229/A 229M, mounted on torsion shaft made of steel tube or solid steel. Provide springs designed for number of operation cycles indicated.
B. Weight Counterbalance: Counterbalance mechanism consisting of filled pipe weights that move vertically in a galvanized-steel weight pipe. Connect pipe weights with cable to weight-cable drums mounted on torsion shaft made of steel tube or solid steel.
C. Cable Drums and Shaft for Doors: Cast-aluminum or gray-iron casting cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised. Mount counterbalance mechanism with manufacturer's standard ball-bearing brackets at each end of torsion shaft. Provide one additional midpoint

bracket for shafts up to 16 feet (4.88 m) long and two additional brackets at one-third points to support shafts more than 16 feet (4.88 m) long unless closer spacing is recommended by door manufacturer.

D. Cables: Galvanized-steel, multistrand, lifting cables with cable safety factor of at least 7 to 1.

E. Cable Safety Device: Include a spring-loaded steel or spring-loaded bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if either lifting cable breaks.

F. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.

G. Bumper: Provide spring bumper at each horizontal track to cushion door at end of opening operation.

1.14 ELECTRIC DOOR OPERATORS

A. General: Electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and "operation cycles" requirement specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
      a. Chamberlain Group, Inc. (The).
   2. Comply with NFPA 70.
   3. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24-V ac or dc.

B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each door.

C. Door-Operator Type: Unit consisting of electric motor, gears, pulleys, belts, sprockets, chains, and controls needed to operate door and meet required usage classification.
   1. Trolley: Trolley operator mounted to ceiling above and to rear of door in raised position and directly connected to door with drawbar.

D. Motors: Reversible-type motor for motor exposure indicated.
   1. Electrical Characteristics:
      a. Phase: Polyphase.
      b. Volts: 208 V.
      c. Hertz: 60.
   2. Motor Size: Large enough to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. (203 mm/s) and not more than 12 in./sec. (305 mm/s), without exceeding nameplate ratings or service factor.
   3. Operating Controls, Controllers (Disconnect Switches), Wiring Devices, and Wiring: Manufacturer's standard unless otherwise indicated.
   4. Coordinate wiring requirements and electrical characteristics of motors and other electrical devices with building electrical system and each location where installed.
   5. Use adjustable motor-mounting bases for belt-driven operators.

E. Limit Switches: Equip motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.

F. Obstruction Detection Device: External entrapment protection consisting of indicated automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.
   1. Photoelectric Sensor: Manufacturer's standard system designed to detect an obstruction in door opening without contact between door and obstruction.
      a. Self-Monitoring Type: Designed to interface with door operator control circuit to detect damage to or disconnection of sensing device. When self-monitoring feature is activated, door closes only with sustained pressure on close button.

G. Control Station: Three-button control station in fixed location with momentary-contact push-button controls labeled "Open" and "Stop" and sustained- or constant-pressure, push-button control labeled "Close."
   1. Interior-Mounted Units: Full-guarded, surface-mounted, heavy-duty type, with general-purpose NEMA ICS 6, Type 1 enclosure.

H. Emergency Manual Operation: Equip electrically powered door with capability for emergency manual operation. Design manual mechanism so required force for door operation does not exceed 35 lbf (155 N).

I. Emergency Operation Disconnect Device: Equip operator with hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.

J. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

1.15 GENERAL FINISH REQUIREMENTS
- A. Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

1.16 STEEL AND GALVANIZED-STEEL FINISHES
- A. Factory Prime Finish: Manufacturer's standard primer, compatible with field-applied finish. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry film thickness.

1.17 EXAMINATION
- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

1.18 INSTALLATION
- A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Tracks:
  1. Hang horizontal track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.
- C. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

1.19 STARTUP SERVICES
- A. Engage a factory-authorized service representative to perform startup service.
  1. Complete installation and startup checks according to manufacturer's written instructions.

1.20 ADJUSTING
- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust doors and seals to provide weather-resistant fit around entire perimeter.
- D. Touch-up Painting: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A 780/A 780M.

1.21 DEMONSTRATION
- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION 08 36 13

SECTION 08 71 00 - DOOR HARDWARE

1.1 WARRANTY
- A. Materials and Workmanship: Three years.

1.2 MAINTENANCE SERVICE
- A. Full-Maintenance Service: 12 months.

1.3 PERFORMANCE REQUIREMENTS
- A. Quality: Commercial.
- B. Fire-Rated Door Assemblies: [NFPA 80] [and positive pressure testing per NFPA 252 or UL 10C].
- C. Electrified Door Hardware: NFPA 70.
- D. Accessibility: ICC A117.1.

1.4 COMPONENTS
- A. Door Closers: Per code.
- B. Keying: Per Owner's standard.
- C. FINISH: As indicated on schedule.

1.5 FIELD QUALITY CONTROL
- A. Independent Architectural Hardware Consultant: Contractor engaged.
- B. Occupancy Adjustment: After six months.

1.6 DOOR HARDWARE SCHEDULE

HARDWARE SET: 01

FOR USE ON DOOR #(S):

1/101B 2/101B

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
4	EA	HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC HARDWARE	CD-99-L-17	626	VON
1	EA	MORTISE CYLINDER	AS REQUIRED/VERIFY KEYWAY	626	MED
1	EA	RIM CYLINDER	AS REQUIRED/VERIFY KEYWAY	626	MED
1	EA	KICK PLATE	8400 10″ X 2″ LDW B-CS	630	IVE
1	EA	SURFACE CLOSER	4040XP SCUSH	689	LCN
1	EA	RAIN DRIP	142A	AA	ZER
1	EA	GASKETING	429AA	AA	ZER
1	EA	DOOR SWEEP	8197AA	AA	ZER
1	EA	THRESHOLD	65A	AA	ZER

NOTE: INSTALL WEATHERSTRIP AT FRAME HEAD FIRST, THEN INSTALL CLOSER PA BRACKET ON WEATHERSTRIP.

HARDWARE SET: 02

FOR USE ON DOOR #(S):

1/101

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

QTY		DESCRIPTION	CATALOG NUMBER	FINISH	MFR
3	EA	HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	CLASSROOM LOCK	L9070L 17A	626	SCH
1	EA	MORTISE CYLINDER	AS REQUIRED/VERIFY KEYWAY	626	MED
1	EA	KICK PLATE	8400 10″ X 2″ LDW B-CS	630	IVE
1	EA	SURFACE CLOSER	4040XP RW/PA	689	LCN
1	EA	WALL STOP	WS406/407CCV	630	IVE
1	EA	GASKETING	8144SBK	BK	ZER

END OF SECTION 08 71 00

SECTION 08 80 00 - GLAZING

1.1 SUMMARY
- A. Glass for **doors** and **storefront framing**.

1.2 WARRANTY
- A. Insulating Glass: 10 years.

1.3 PERFORMANCE REQUIREMENTS
- A. Delegated Design: Engineering design of glass by Contractor.
- B. Windborne-Debris-Impact Resistance of Exterior Glazing: Wind Zone 4.

1.4 MANUFACTURERS
- A. Basis-of-Design Product [(Unless Otherwise Indicated): Subject to compliance with requirements, provide product indicated in glass schedules or comparable product by one of the following:
  1. Guardian Industries Corp.; SunGuard.
  2. Viracon, Inc.
  3. Vitro Architectural Glass.
- B. Fabricators: Subject to compliance with requirements, provide products by one of the fabricators specified.
  1. Insulite Glass Company.
  2. OldCastle Oldcastle BuildingEnvelope.
  3. Viracon, Inc.
- C. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
- D. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

1.5 MATERIALS
- A. Spacer: Warm edge in color selected by Architect.
- B. Silicone Glazing Sealants: Per Section 07 92 00 “Joint Sealants.”
- C. Glazing Tapes: Expanded-cellular type.
- D. Glazing Channels.

1.6 INSULATING GLASS SCHEDULE
- A. Glass Type **GI1**: Low-E-coated, clear insulating glass.
  1. Basis of Design Product: PPG Solarban 90, coating sputtered on second surface.
  2. Outdoor Lite: Fully tempered float glass.
  3. Innerspace Content: Argon.
  4. Indoor Lite: Fully tempered float glass.

1.7 FABRICATION
- A. Exposed Edges or Corners: Grind smooth and polish.

END OF SECTION 08 80 00

SECTION 08 91 19 - FIXED LOUVERS

1.1 PERFORMANCE REQUIREMENTS
- A. Delegated Design: Engineering design of louvers by Contractor.
- B. Wind Loads: Indicated on Drawings.
- C. Seismic Performance:
  1. Design earthquake spectral response acceleration, short period (Sds) for Project is indicated on Drawings.
  2. Component Importance Factor is indicated on Drawings.
- D. Windborne-Debris-Impact Resistance: Louvers located within 30 feet (9.1 m) of grade pass basic protection, when tested according to AMCA 540.

1.2 MANUFACTURERS
1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   - a. All-Lite Architectural Products.
   - b. Construction Specialties, Inc.
   - c. Greenheck Fan Corporation.
   - d. Nystrom, Inc.
   - e. Pottorff.
   - f. Reliable Products, Inc.
   - g. Ruskin Company; Tomkins PLC.

1.3 PRODUCTS
- A. Fixed Extruded-Aluminum Louvers:
  1. Horizontal Drainable-Blade Louver: 4 inches (100 mm) deep with exposed mullions.
- B. Louver Screens:
  1. Provided at each exterior louver.
  2. Screening Type: Bird screening.
- C. Blank-Off Panels: Insulated.
- D. Finishes:
  1. Aluminum: Three-coat fluoropolymer.
  2. Galvanized Steel: Baked enamel or powder coat.

1.4 FABRICATION
- A. Provide subsills made of same material as louvers for recessed louvers.

1.5 INSTALLATION
- A. Corrosion Protection: Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- B. Build vents into masonry work as construction progresses; comply with requirements in Section 042000 "Unit Masonry."

END OF SECTION 08 91 19

SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES

1.1 PERFORMANCE REQUIREMENTS
- A. Fire-Resistance Ratings: As indicated on Drawings.
- B. STC-Ratings: As indicated on Drawings.

1.2 MATERIALS
- A. Interior Gypsum Board:
  - 1. Gypsum board, Type X: ASTM C 1396/C 1396M; 5/8-inch.
    - a. Basis of Design Product: USG Corporation; Sheetrock Brand EcoSmart Panels Firecode X.
  - 2. Abuse-resistant gypsum board: ASTM C 1629/C 1629M, ASTM D 3273, score of 10 as rated according to ASTM D 3274; 5/8 inch (15.9 mm), Type X.
  - 3. Mold-resistant gypsum board: ASTM C 1396/C 1396M; ASTM D 3273, score of 10 as rated according to ASTM D 3274; 5/8 inch (15.9 mm)**,** Type X.
    - a. Basis of Design Product: USG Corporation; Sheetrock Brand EcoSmart Panels Mold Tough Firecode X.
- B. Trim Accessories:
  - 1. Interior: ASTM C 1047; Galvanized or aluminum-coated steel sheet or rolled zinc.
    - a. Shapes: Cornerbead and LC-Bead
  - 2. Aluminum: Extruded profiles.
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Fry Reglet Corp.
      - 2) Gordon, Inc.
      - 3) Pittcon Industries.
- C. Steel Framing: ASTM C 754; Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 (Z120).
  - 1. Steel studs and tracks: ASTM C 645.
    - a. Embossed, high-strength steel studs and tracks: 0.033-inch; 3-5/8 inches (92 mm) minimum.
  - 2. Slip-Type Head Joints:
    - a. Single long-leg track.
  - 3. Flat strap and backing plate: 0.033 inch (0.84 mm) minimum.
  - 4. Hat-shaped, rigid furring channels; ASTM C 645; 0.018 inch (0.45 mm) minimum thickness; 7/8 inch (22.2 mm).

1.3 AUXILIARY MATERIALS
- A. Joint Tape:
  - 1. Interior Gypsum Board: Paper.
- B. Joint Compound for Interior Gypsum Board
  - 1. Prefilling, Embedding, Paper-faced Metal Trim Accessories, and First Coat: Setting-type taping compound.
  - 2. Fill and Finish Coats: Drying-type, all-purpose compound.
  - 3. Skim Coat: High-build interior coating.
- C. Laminating Adhesive.
- D. Viscoelastic Damping Adhesive:
  - 1. Products:
    - a. Green Glue Company; Green Glue Noiseproofing Compound and Sealant.
    - b. Pinta Acoustic; Decibel Drop.
    - c. Quiet Rock; Quiet Glue.
    - d. Sound Sense; Sound Glue.
- E. Acoustical Sealant: Per Section 07 92 00 “Joint Sealants.”
- F. Sound attenuation blankets: ASTM C 665, Type I (blankets without membrane facing).

1.4 INSTALLATION
- A. Coordinate sprayed fire-resistive materials with gypsum board shaft wall assemblies so both elements of Work remain complete and undamaged.
- B. Install gypsum board panels per ASTM C 840.
- C. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.
- D. Install interior gypsum board in the following locations:
  - 1. Type X: Unless otherwise indicated .
  - 2. Abuse-Resistant Type: As indicated on Drawings.
  - 3. Moisture- and Mold-Resistant Type: At interior face of exterior perimeter walls..

E. Control Joints: Install control joints at locations indicated on Drawings and according to ASTM C 840. If not indicated, locate per following:
   1. Interior Partitions: 30 ft. maximum in either direction.
      a. Isolate perimeter of gypsum panels from building structure.
      b. Locate control joints where expansion or control joints occur in the base wall construction and/or building structure.
      c. Door Jambs and Openings Control Joints: Act as vertical control joints as follows:
         1) Full height door jambs or openings.
         2) Partial height door jamb or opening with control joint installed at head of door or opening only where required to meet 30 ft. maximum.
   2. Interior Partitions and Ceilings: Isolate partitions or ceilings of dissimilar construction meet and remain in the same plane.

F. Interior Trim:
   1. Cornerbead: Outside corners.
   2. Bullnose Bead: Outside corners.
   3. LC-Bead: Exposed panel edges.

G. Aluminum Trim: Install in locations indicated on Drawings.

H. Gypsum board finish levels: ASTM C840.
   1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
   2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated.

END OF SECTION 09 21 16

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

1.1 PERFORMANCE REQUIREMENTS
- A. Flame-Spread Index: Class A.
- B. Smoke-Developed Index: 50.

1.2 PRODUCTS
- A. Acoustical Panels<**AC1**>.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  2. Basis-of-Design Product: Subject to compliance with requirements, provide <**Ultima High NRC by Armstrong World Industries, Inc.** > or comparable product by one of the following:
     a. CertainTeed Corp.
     b. USG Interiors, Inc.; Subsidiary of USG Corporation.
  3. Color: White.
  4. CAC: <**35**>.
  5. NRC: <**0.80**>.
  6. AC: <**170**>.
  7. Edge/Joint Detail: <**Beveled Tegular**>.
  8. Thickness: 9/16 inch (15 mm).
  9. Modular Size: 24 by 24 inches (610 by 610 mm).
- B. Metal Suspension System: <**AC1**>.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  2. Basis-of-Design Product: Subject to compliance with requirements, provide <**9/16" Suprafine by Armstrong World Industries, Inc.**> or comparable product by one of the following:
     a. CertainTeed Corp.
     b. USG Interiors, Inc.; Subsidiary of USG Corporation.
  3. Narrow-Face, Capped, Double-Web Steel: Intermediate-duty system.
  4. Finish: Painted white.
  5. Attachment Devices: power actuated.
  6. Hold-down clips.
  7. Impact clips.
  8. Seismic perimeter stabilizer bars, struts, and clips.
  9. Clean-room gasket system.
- C. Metal Edge Moldings and Trim: Roll-formed sheet metal.
  1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  2. Basis-of-Design Product: Subject to compliance with requirements, provide <**products by primary suspension system manufacturer.**> or comparable product by one of the following:
  3. Finish: Painted white.
- D. Acoustical Sealant: Per Section 07 92 00 "Joint Sealants."

1.3 INSTALLATION
- A. Install acoustical panel ceilings per ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels with continuous ribbon concealed on back of vertical legs of moldings before they are installed.
- C. Paint cut edges of panel remaining exposed after installation to match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

END OF SECTION 09 51 13

SECTION 09 65 00 - RESILIENT FLOORING

1.1 PRODUCTS
- A. Solid Vinyl Floor Tile: Printed film vinyl tile.
  1. Basis of Design: Per Finish Material Schedule
  2. Surface: Embossed.
  3. Thickness: 0.120 inch (3.0 mm).
  4. Size: 18 by 18 inches (457 by 457 mm).
  5. Installation Method: Glue-down
- B. Installation Materials:
  1. Trowelable leveling and patching compounds.
  2. Adhesives.

1.2 INSTALLATION
- A. Concrete Substrates: Prepare per ASTM F 170;
  1. Relative humidity test with in situ probes, maximum 75 percent relative humidity level measurement; additional moisture tests recommended in writing by adhesive and flooring manufacturers. Proceed with installation only after substrates pass testing.
  2. Alkalinity and Adhesion Testing: Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than [**9**] [**10**] pH.
- B. Lay tiles square with room axis.
- C. Lay tiles with grain direction alternating in adjacent tiles (basket-weave pattern).
- D. Mix together floor tiles from each carton to ensure uniform distribution of shade.
- E.

END OF SECTION 09 65 00

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

1.1 PRODUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Johnsonite; A Tarkett Company.

B. Resilient Base: Thermoset rubber.
   1. Style and Location:
      a. Cove: In areas with hard surfaces or resilient flooring.
      b. Butt to: In areas indicated.
   2. Height and Thickness: 2-1/2 inches (64 mm).
   3. Outside Corners: Preformed.
   4. Inside Corners: Job formed or preformed.

C. Resilient Accessories: Rubber.
   1. Carpet edge for glue-down applications.
   2. Reducer strip for resilient flooring.
   3. Transition strips.

D. Installation Materials:
   1. Trowelable leveling and patching compounds.
   2. Adhesives.
   3. Metal Edge Strips: Angle or L-shape, metallic; aluminum exposed-edge material.
      a. Location: Exposed edge of carpet or tile meets resilient flooring or exposed concrete.
         1) Basis-of-Design Product: Schluter-Systems; RENO-U.
         2) Height: To match carpet or tile.

1.2 INSTALLATION

A. Concrete Substrates: Relative humidity test with in situ probes, ASTM F 2170; maximum [**75**] <**Insert number**> percent relative humidity level measurement; additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

B. Preformed Corners: Install preformed corners before installing straight pieces.

C. Job-Formed Corners:
   1. Outside Corners: Form without producing discoloration (whitening) at bends with returns not less than 3 inches (76 mm) in length.
   2. Inside Corners: Miter or cope corners to minimize open joints with returns not less than 3 inches (76 mm) in length..

D. Metal edge strips: Center under door leaf.

END OF SECTION 09 65 13

SECTION 09 91 00 - PAINTING

1.1 INSTALLATION

A. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Concrete: 12 percent.
   2. Masonry (Clay and CMU): 12 percent.
   3. Wood: 15 percent.
   4. Gypsum Board: 12 percent.

B. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk and clean with pressurized water. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.

C. Masonry Substrates: Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions.
   1. Clean surfaces with pressurized water.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
   1. Clean according to SSPC-SP 3, "Power Tool Cleaning"."

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with shop-applied primer.

F. Galvanized-Metal Substrates: Remove grease and oil residue by mechanical methods to produce clean, lightly etched surfaces with 1 mil profile that promotes adhesion of subsequently applied coatings.

G. Aluminum Substrates: Remove loose surface oxidation.

H. Wood Substrates: Scrape and clean knots and apply coat of knot sealer. Sand and dust off surfaces exposed to view. Prime all sides and edges. Fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

I. Previously Painted Surfaces: Thoroughly clean previously painted surfaces to be repainted or damaged during construction. Remove chalking, blistering, cracking, flaking and peeling or other deteriorated coatings. Roughen slick, glossy surfaces. Repair damaged areas such as, but not limited to, nail holes, cracks, chips, and spalls with suitable material to match adjacent undamaged areas. Feather edges and sand smooth all edges of chipped paint. New, proposed coatings to be compatible with existing coatings.

1.2 INTERIOR PAINT SCHEDULE

A. Concrete and Masonry (Other Than Concrete Unit Masonry): Provide the following paint systems over interior concrete and brick masonry substrates:
   1. Low-Luster Acrylic-Enamel Finish: Two finish coats over a primer.
      a. Primer: Factory-formulated alkali-resistant acrylic-latex interior primer for interior application.
         1) Benjamin Moore; Ultra Spec 500 Interior Latex Primer 534.
         2) Diamond Vogel; OmniPrep Universal Interior Primer.
         3) PPG; Speedhide Zero Interior Latex Sealer 6-4900XI.
         4) Sherwin-Williams; Loxon Concrete and Masonry Primer, A24W8300.
      b. Finish Coats: Factory-formulated low-luster acrylic-latex interior enamel.
         1) Benjamin Moore; Ultra Spec 500 Interior Eggshell 538.
         2) Diamond Vogel; Zero Plus Interior Zero VOC Latex - Eggshell.
         3) PPG; Speedhide Zero Interior Latex Eggshell 6-4310XI.
         4) Sherwin-Williams; ProMar 200 Zero VOC Eg-Shel, B20-2600.

B. Gypsum Board: Provide the following finish systems over interior gypsum board surfaces:
   1. Low-Luster Acrylic-Enamel Finish: Two finish coats over a primer.
      a. Location: Exposed vertical surfaces.
      b. Primer: Factory-formulated latex-based primer for interior application.
         1) Benjamin Moore; Ultra Spec 500 Interior Latex Primer 534.
         2) Diamond Vogel; Zero Plus Interior Zero VOC Latex Primer.
         3) PPG; Speedhide Zero Interior Latex Sealer 6-4900XI.
         4) Sherwin-Williams; ProMar 200 Zero VOC Primer B28 Series.
      c. Finish Coats: Factory-formulated low-luster acrylic-latex interior enamel.
         1) Benjamin Moore; Ultra Spec 500 Interior Eggshell 538.
         2) Diamond Vogel; Zero Plus Interior Zero VOC Latex - Eggshell.
         3) PPG; Speedhide Zero Interior Latex Eggshell 6-4310XI.
         4) Sherwin-Williams; ProMar 200 Zero VOC Eg-Shel, B20-2600.
   2. Low-Luster Acrylic-Enamel Finish (Deep Color): Two finish coats over a primer.
      a. Location: Exposed vertical surfaces.
      b. Primer: Factory-formulated latex-based primer for interior application.

1) Benjamin Moore; Ultra Spec 500 Interior Latex Primer 534.
2) Diamond Vogel; Zero Plus Interior Zero VOC Latex Primer.
3) PPG; Speedhide Zero Interior Latex Sealer 6-4900XI.
4) Sherwin-Williams; ProMar 200 Zero VOC Primer B28 Series.

c. Finish Coats: Factory-formulated low-luster acrylic-latex interior enamel.
1) Benjamin Moore; Ultra Spec 500 Interior Eggshell 538.
2) Diamond Vogel; Zero Plus Interior Zero VOC Latex - Eggshell.
3) PPG; Speedhide Zero Interior Latex Eggshell 6-4320XI Midtone base.
4) PPG; Speedhide Zero Interior Latex Eggshell 6-4330XI Ultra Deep base.
5) Sherwin-Williams; ProMar 200 Zero VOC Eg-Shel, B20-2600.

1.3 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates:
1. Semigloss, Fluoropolymer Coating System:
a. Prime Coat: Inorganic zinc primer. – Note: These are organic zinc rich primers
1) Carboline: Carbozinc 859
2) PPG: Amercoat 68MCZ.
3) Tnemec: Series 90-97 Tneme-Zinc.
b. Intermediate Coat: Aliphatic Acrylic Polyurethane.
1) Carboline 133HB
2) PPG: Amercoat 450H.
3) Tnemec: Series 73 Eudura-Shield.
c. Topcoat: Thermoset solution fluoropolymer.
1) Carboline: Carboxane 950 VOC
2) PPG: Coraflon ADS.
3) Tnemec: Series 1071 Fluoronar.

B. Galvanized-Metal Substrates:
1. Semigloss, Fluoropolymer Coating System:
a. Prime Coat: Polyamide epoxy.
1) Carboline: Carboguard 890
2) PPG: Amerlock 2.
3) Tnemec: Series 66HS Hi-Build Epoxoline.
b. Intermediate Coat: Aliphatic Acrylic Polyurethane.
1) Carboline: Carbothane 133HB
2) PPG: Amercoat 2.
3) Tnemec: Series 73 Eudura-Shield.
c. Topcoat: Thermoset solution fluoropolymer.
1) Carboline: Carboxane 950VOC
2) PPG: Coraflon ADS.
3) Tnemec: Series 1071 Fluoronar.

C. Aluminum (Not Anodized or Otherwise Coated) Substrates:
1. Semigloss, Fluoropolymer Coating System:
a. Prime Coat: Polyamide epoxy.
1) Carboline: Carboguard 890
2) PPG: Amerlock 2.
3) Tnemec: Series 66HS Hi-Build Epoxoline.
b. Intermediate Coat: Aliphatic Acrylic Polyurethane.
1) Carboline: Carbothane 133HB
2) PPG: Amercoat 450H.
3) Tnemec: Series 73 Eudura-Shield.
c. Topcoat: Thermoset solution fluoropolymer.
1) Carboline: Carboxane 950 VOC
2) PPG: Coraflon ADS.
3) Tnemec: Series 1071 Fluoronar.

1.4 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates:
1. Eggshell, Water-Based, Light-Industrial Coating System:
a. Prime Coat Steel Structure: Inorganic zinc primer.
1) Benjamin Moore: Corotech Organic Zinc Rich Primer V170.
2) Diamond Vogel: Endura-Zinc 705 Organic Zinc Rich Epoxy Ester Primer.
3) PPG: Metalhide, One-Pac Inorganic Zinc Rich Primer, 97-676 Series.
4) Sherwin-Williams: Zinc Clad III HS 100 Organic Zinc Rich Primer B69-110.
b. Intermediate Coat: Water-based, light-industrial coating, gloss matching topcoat.

1) Benjamin Moore: Moore Ultra Spec HP D.T.M. Acrylic Low Lustre HP25.
2) Diamond Vogel: Vers-Acryl 303 Acrylic DTM Primer/Finish - Low Sheen.
3) PPG: Pitt-Tech Plus Int/Ext Satin DTM Industrial Enamel 90-1110 series.
4) Sherwin-Williams: Pro Industrial DTM Eg-Shel B66-1200 Series.

c. Topcoat: Water-based, light-industrial coating,
1) Benjamin Moore: Moore Ultra Spec HP D.T.M. Acrylic Low Lustre HP25.
2) Diamond Vogel: Vers-Acryl 303 Acrylic DTM Primer/Finish - Low Sheen.
3) PPG: Pitt-Tech Plus Int/Ext Satin DTM Industrial Enamel 90-1110 series.
4) Sherwin-Williams: Pro Industrial DTM Eg-Shel B66-1200 Series.

B. Aluminum (Not Anodized or Otherwise Coated) Substrates:
1. Eggshell, Water-Based, Light-Industrial Coating System:
a. Prime Coat: Quick-drying primer for aluminum
1) Benjamin Moore: Moore Ultra Spec HP Acrylic Metal Primer HP04.
2) Diamond Vogel: Vers-Acryl 303 Acrylic DTM Primer/Finish.
3) PPG: Pitt-Tech Plus Int/Ext Acrylic DTM Industrial Primer, 4020 Series.
4) Sherwin-Williams; Pro-Cryl Universal Water Based Primer B66W310.
b. Intermediate Coat: Water-based, light-industrial coating, gloss matching topcoat.
1) Benjamin Moore: Moore Ultra Spec HP D.T.M. Acrylic Low Lustre HP25.
2) Diamond Vogel: Vers-Acryl 303 Acrylic DTM Primer/Finish - Low Sheen.
3) PPG: Pitt-Tech Plus Int/Ext Satin DTM Industrial Enamel 90-1110 Series.
4) Sherwin-Williams: Pro Industrial DTM Eg-Shel B66-1200 Series.
c. Topcoat: Water-based, light-industrial coating,
1) Benjamin Moore: Moore Ultra Spec HP D.T.M. Acrylic Low Lustre HP25.
2) Diamond Vogel: Vers-Acryl 303 Acrylic DTM Primer/Finish - Low Sheen.
3) PPG: Pitt-Tech Plus Int/Ext Satin DTM Industrial Enamel 90-1110 Series.
4) Sherwin-Williams: Pro Industrial DTM Eg-Shel B66-1200 Series.

C. Wood.
1. Eggshell, Water-Based, Light-Industrial Coating System:
a. Prime Coat: Water-based, light-industrial coating, gloss matching topcoat
1) Benjamin Moore: Moore Sure Seal Latex Primer Sealer 027.
2) Diamond Vogel: Zero Plus Interior Zero VOC Latex Primer.
3) PPG: Seal-Grip; Int/Ext Acrylic Latex Primer, 17-921XI Series.
4) Sherwin-Williams; ProMar 200 Zero VOC Primer B28 Series.
b. Intermediate Coat: Water-based, light-industrial coating, gloss matching topcoat.
1) Moore: Moore Ultra Spec HP D.T.M. Acrylic Low Lustre HP25.
2) Diamond Vogel: Vers-Acryl 303 Acrylic DTM Primer/Finish - Low Sheen.
3) PPG: Pitt-Tech Plus Int/Ext Satin DTM Industrial Enamel 90-1110 Series.
4) Sherwin-Williams: Pro Industrial DTM Eg-Shel B66-1200 Series.
c. Topcoat: Water-based, light-industrial coating,
1) Benjamin Moore: Moore Ultra Spec HP D.T.M. Acrylic Low Lustre HP25.
2) Diamond Vogel: Vers-Acryl 303 Acrylic DTM Primer/Finish - Low Sheen.
3) PPG: Pitt-Tech Plus Int/Ext Satin DTM Industrial Enamel 90-1110 Series.
4) Sherwin-Williams: Pro Industrial DTM Eg-Shel B66-1200 Series.

D. All Overhead Surfaces in areas indicated to receive high-performance coatings and located generally above level of suspended light fixtures Provide the following finish systems over all overhead surfaces; including, but are not limited to; pipes, conduit, cables, ductwork, grilles, diffusers, mechanical and electrical equipment, underside of slabs or decks, structural framing, gypsum board fireproofing, and miscellaneous structural elements, etc.
1. Primer: Provide primer or barrier coat as recommended by manufacturer. Omit primer where not required by manufacturer.
2. One Coat Flat Acrylic Dry Fall (DF) System applied at spreading rate recommended by manufacturer to achieve a dry film thickness of 3.0 to 4.0 mils.
a. Benjamin Moore: Sweep-Up Spray Latex Flat 153.
b. PPG: Speedhide Super Tech WB Acrylic Dry-Fog Flat Latex, 6-725XI.
c. Sherwin-Williams: Pro Industrial Waterborne Acrylic Dryfall Flat B42W181.

END OF SECTION 09 91 00

SECTION 10 44 00 - FIRE PROTECTION SPECIALTIES

1.1 WARRANTY
- A. Materials and Workmanship: Six years.

1.2 PERFORMANCE REQUIREMENTS
- A. Fire Extinguishers: Complying with NFPA 10 and approved, listed, and labeled by FM Global.

1.3 PRODUCTS
- A. Fire-Protection Cabinets:
  1. Basis-of-Design Product: Subject to compliance with requirements, provide Larsens Manufacturing Company, 3612-RL Architectural Series or comparable product by one of the following:
     a. Fire End & Croker Corporation.
     b. Guardian Fire Equipment, Inc.
     c. JL Industries, Inc.
  2. Type: Fire extinguisher.
  3. Cabinet Construction: Nonrated.
  4. Mounting: Surface mounted.
  5. Door Style: Solid opaque panel with frame.
  6. Door lock: Cam.
  7. Identification Pressure-sensitive vinyl letters..
     a. Lettering Color: Black.
     b. Orientation: Vertical.
  8. Finish:
     a. Stainless Steel: ASTM A480/A480M No. 4 directional satin finish.
- B. Portable Hand-Carried Fire Extinguishers:
  1. Match style, rating, and weight of existing Portable Fire Extinguishers.
- C. Mounting brackets.
  1. Identification: Vertical.lettering; locate as indicated by Architect.

END OF SECTION 10 44 00

SECTION 31 10 00 - SITE CLEARING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
1. Protection of existing trees indicated to remain.
2. Removal of trees and other vegetation within the "Limits of Work" that are not designated on reference drawings to "remain."
3. Topsoil stripping.
4. Clearing and grubbing.
5. Removing above- and below-grade site improvements that interfere with new construction or that are shown to be removed on the contract drawings.
6. Dust control.
7. Protection of all existing improvements and utilities shown to remain.
8. Disconnecting, capping or sealing, and abandoning or removing site utilities in place.

1.3 RELATED SECTIONS

A. The following sections contain requirements that relate to this Section:
1. Division 1, Section 312000, Earthwork.

1.4 PROJECT CONDITIONS

A. Traffic: Conduct site-clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
1. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

B. Protection of Existing Improvements: Provide protections necessary to prevent damage to existing improvements indicated to remain in place.
1. Protect improvements on adjoining properties and on Owner's property.
2. Restore damaged improvements to their original condition, as acceptable to owner.

C. Protection of Existing Trees and Vegetation: Protect existing trees and other vegetation indicated to remain in place against unnecessary cutting, breaking or skinning of roots, skinning or bruising of bark, smothering of trees by stockpiling construction materials or excavated materials within drip line, excess foot or vehicular traffic, or parking of vehicles within drip line. Provide temporary guards to protect trees and vegetation to be left standing.
1. Water trees and other vegetation to remain within limits of contract work as required to maintain their health during course of construction operations.
2. Provide protection for roots over 1-1/2 inch in diameter that are cut during construction operations. Coat cut faces with an emulsified asphalt or other acceptable coating formulated to use on damaged plant tissues. Temporarily cover exposed roots with wet burlap to prevent roots from drying out; cover with earth as soon as possible.
3. Repair or replace trees and vegetation indicated to remain that are damaged by construction operations in a manner acceptable to Owner's Representative. Employ a licensed arborist to repair damage to trees and shrubs.
4. Replace trees that cannot be repaired and restored to full-growth status, as determined by arborist.

D. Salvable Improvements: Carefully remove items indicated to be salvaged and store where indicated or directed by Owner's Representative.

E. Dust Control: Contractor shall contain particulate debris generated by his work activities from polluting the atmosphere or waterways.

F. Blasting will not be permitted.

1.5 EXISTING SERVICES

A. General: The information concerning the location of existing utilities as shown on the contract drawings have been taken from the records of the various utility companies and from field locations as marked by locators representing said utility companies. These locations are not to be construed as accurate or exact. Utility locations shall be verified in the field by the Contractor, prior to the commencement of construction.

B. Arrange and pay for disconnecting, removing, capping, and plugging utility services. Notify affected utility companies in advance and obtain approval before starting this Work.

C. Place markers to indicate location of disconnected services. Identify service lines and capping locations on Project Record Documents.

D. Protect all existing utilities shown to remain.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SITE CLEARING

A. General: Remove trees, shrubs, grass, and other vegetation, improvements, or obstructions, as required, to permit installation of new construction. Remove similar items elsewhere on site or premises as specifically indicated. Removal includes digging out and off-site disposal of stumps and roots.
   1. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.

B. Topsoil: Topsoil is defined as friable clay loam surface soil found in a depth of not less than 4 inches. Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over in diameter, and without weeds, roots, and other objectionable material.
   1. Strip topsoil and store in designated location on site for re-use.
   2. Limit height of topsoil stockpiles to 72 inches.
   3. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.
      a. Where existing trees are indicated to remain, leave existing topsoil in place within drip lines to prevent damage to root system.

C. Clearing and Grubbing: Clear site of trees, shrubs, and other vegetation, except for those indicated to be left standing.
   1. Completely remove stumps, roots, and other debris protruding through ground surface.
   2. Use only hand methods for grubbing inside drip line of trees indicated to remain.
   3. Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.
      a. Place fill material in horizontal layers not exceeding 8 inches loose depth, and thoroughly compact each layer according to Section 312000 EARTHWORK.
   4. All organic or other deleterious materials shall be removed from the project site prior to construction. Areas containing such material shall be overexcavated and reconstructed with engineered fill according to the requirements of Section 312000 EARTHWORK.

D. Removal of Improvements: Remove existing above-grade and below-grade improvements as indicated and as necessary to facilitate new construction.

1. Abandonment or removal of certain underground pipe or conduits is indicated on site utility drawings and is included under work of related Division 22 and 26 Sections. Removing abandoned underground piping or conduits interfering with construction is included under this Section.
2. Remove slabs, paving, curbs, gutters, and aggregate base as indicated.
   a. Unless existing full-depth joints coincide with the line of demolition, neatly saw-cut the length of existing pavement to remain before removing the existing pavement. Saw cut faces vertically.
   b. Paint cut ends of steel reinforcement in concrete to remain to prevent corrosion.

3.2 DISPOSAL OF WASTE MATERIALS

A. Burning on Owner's Property: Burning is not permitted on Owner's property.

B. Removal from Owner's Property: Remove waste materials from Owner's property and dispose of legally.

3.3 ENVIRONMENTAL PROTECTION

A. Prevent debris, soil erosion, pollutants and all other unacceptable material from entering the existing storm and sanitary sewer systems. Prevent dust, smoke or other air borne material from polluting the atmosphere.

3.4 MONUMENT PROTECTION

A. Monuments, bench marks and other reference features bounding this project shall be protected. Should these be disturbed in any manner, the Contractor shall have them replaced as approved by the Owner with no additional cost to the Owner.

END OF SECTION 311000

SECTION 31 20 00 - EARTHWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings; General Conditions of the Contract for Design/Build, Special and Supplementary Conditions; and Division 1 Guideline Specification Sections, apply to the work of this Section.

1.2 SUMMARY

A. This Section includes the following:
1. Preparing and grading subgrades for slabs-on-grade, walks, pavements, and landscaping.
2. Excavating and backfilling for buildings and structures.
3. Drainage and moisture-control fill course for slabs-on-grade.
4. Subbase course for walks and pavements.
5. Subsurface drainage backfill for walls and trenches.
6. Excavating and backfilling trenches within building lines.
7. Excavating and backfilling for underground mechanical and electrical utilities and appurtenances.

B. Related Sections: The following Sections contain requirements that relate to this Section.

1. Division 31 Section "Site Clearing" for site stripping, grubbing, topsoil removal, tree protection and removal.
2. Division 32 Section "Hot-Mix Asphalt Paving" for proof rolling bases or subbases.
3. Division 32 Section "Portland Cement Concrete Paving" for proof rolling bases or subbases.
4. Division 22 Section "Water Systems" for excavation, trenching and backfilling.
5. Division 22 Section "Sanitary Sewers" for excavation, trenching and backfilling.
6. Division 03 Section "Cast-In-Place Concrete" for concrete encasings, cradles, and appurtenances for utility systems.

1.3 DEFINITIONS

A. Excavation consists of the removal of material encountered to subgrade elevations and the reuse or disposal of materials removed.

B. Subgrade: The uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, or topsoil materials. Subgrade in lawn/landscape area, to receive topsoil, shall be 6" below finish grade.

C. Borrow: Satisfactory soil material obtained off-site when sufficient approved soil material is not available from excavations.

D. Subbase Course: The layer placed between the subgrade and base course in a paving system or the layer placed between the subgrade and surface of a pavement or walk.

E. Base Course: The layer placed between the subbase and surface pavement in a paving system.

F. Drainage Fill: Course of washed granular material supporting slab-on-grade placed to cut off upward capillary flow of pore water.

G. Unauthorized excavation consists of removing materials beyond indicated subgrade elevations or dimensions without direction by the Owner's Representative. Unauthorized excavation, as well as remedial work directed by the Owner's Representative, shall be at the Contractor's expense.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below ground surface.

1.4 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product data for the following:
1. Sieve analysis for drainage and moisture control fill materials.

C. Test Reports: In addition to test reports required under field quality control, submit the following:
1. Laboratory analysis of each soil material proposed for fill and backfill from on-site and borrow sources.
2. One optimum moisture-maximum density curve for each soil material.
3. Report of actual unconfined compressive strength and/or results of bearing tests of each stratum tested.

D. Preexcavation Photographs or Video: Show existing conditions of adjoining construction and site improvements, including finish surfaces, that might be misconstrued as damage caused by earthwork operations. Submit before earthwork begins.

1.5 QUALITY ASSURANCE

A. Testing and Inspection Service: All testing shall be the responsibility of the Contractor. An independent testing agency qualified according to ASTM E 329 to conduct soil materials and rock-definition testing, as documented according to ASTM D 3740 and ASTM E 329-06, shall be employed.
1. When tests indicate that the density of any layer of fill or portion thereof is below the specified density, such layer or portion shall be rejected until such time that corrective measures are taken necessary to comply with the Contract Documents. It shall be the sole responsibility of the Contractor to achieve the specified degree of compaction.
2. Preinstallation Conference: Conduct conference at Project site.
3. Before commencing earthwork, meet with representatives of the governing authorities, Owner, Owner's Representative, consultants, Geotechnical Engineer, independent testing agency, and other concerned entities. Review earthwork procedures and responsibilities including testing and inspection procedures and requirements. Notify participants at least 3 working days prior to convening conference. Record discussions and agreements and furnish a copy to each participant.

1.6 PROJECT CONDITIONS

A. Existing Utilities: Do not interrupt existing utilities serving facilities occupied by the Owner or others except when permitted in writing by the Owner or his Representative and then only after acceptable temporary utility services have been provided.
1. Provide a minimum 72-hours' notice to the Owner or his Representative and receive written notice to proceed before interrupting any utility.

B. Demolish and completely remove from site existing underground utilities indicated to be removed. Coordinate with utility companies to shutoff services if lines are active.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Satisfactory Soil Materials: ASTM D 2487 soil classification groups CL, CH, GW, GP, SW, SP, and SM,); free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation and other deleterious matter.

B. Low volume change material (LVC) shall be ASTM D 2487 soil classification groups GM or CL with a liquid limit less than 45 and a plasticity index less than 23. MODOT type 5 material shall be acceptable.

C. Unsatisfactory Soil Materials: ASTM D 2487 soil classification groups CH, MH, OL, OH and PT .

C. Base Under Slabs on Grade: Granular fill to be well-graded crushed stone or pea gravel with not less than 95% passing ½" and not less than 95% to be retained on a #4. Place a 6" layer and compact with a vibratory roller.

D. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant polyethylene film warning tape manufactured for marking and identifying underground utilities, 6 inches wide and 4 mils thick minimum, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep.

1. Tape Colors: Provide tape colors to utilities as follows:

a. Red: Electric.
b. Yellow: Gas, oil, steam, and dangerous materials.
c. Orange: Telephone and other communications.
d. Blue: Water systems.
e. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

B. Protect subgrades and foundation soils against freezing temperatures or frost. Provide protective insulating materials as necessary.

C. Provide erosion control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.2 DEWATERING

A. Prevent surface water and subsurface or groundwater from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.

3.3 EXCAVATION

A. Explosives: Do not use explosives.

B. Unclassified Excavation: Excavation is unclassified and includes excavation to required subgrade elevations regardless of the character of materials and obstructions encountered.

3.4 STABILITY OF EXCAVATIONS

A. Comply with local codes, ordinances, and requirements of authorities having jurisdiction to maintain stable excavations.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to required elevations and dimensions within a tolerance of plus or minus 1.2 inches. Extend excavations a sufficient distance from structures for placing and removing concrete formwork, installing services and other construction, and for inspections.
   1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
   2. Bearing soils in the foundation excavation should not be disturbed or allowed to become extremely wet or dry. Foundation bearing surfaces shall be free of loose soil, standing water, and be level. Deleterious materials or isolated soft spots within the foundation shall be over excavated to suitable base and filled to design bearing elevation with lean concrete. Foundation excavation, inspection and concrete placement shall occur on the same day.
   3. Excavation for Underground Tanks, Basins, and Mechanical or Electrical Appurtenances: Excavate to elevations and dimensions required within a tolerance of plus or minus 1 inch. . Do not disturb bottom of excavations intended for bearing surface.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated cross sections, elevations, and grades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated slopes, lines, depths, and invert elevations.

   1. Excavate trenches to uniform widths to provide a working clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit, unless otherwise indicated.
      a. Clearance: 12 inches each side of pipe or conduit.
      b. Length of Open Clearance: The Contractor shall not open more trench in advance of construction than necessary to expedite the work. Three hundred (300) feet will be the maximum length of open trench allowed.
      c. Trench Bracing: Wherever necessary to prevent caving, the excavation shall be adequately sheeted, braced and drained so that workmen may work therein safely and efficiently. The adequacy of trench bracing for safety shall be the Contractor’s sole responsibility.

   2. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove stones and sharp objects to avoid point loading.

   3. Do not perform trench excavation in areas to receive fill until fill operations are complete to an elevation of not less than 24 inches above the top of the proposed pipe or conduit for which the trench is to receive.

3.8 APPROVAL OF SUBGRADE

A. Notify Owner's Representative and testing agency when excavations have reached required subgrade. Approval by the Owner's Geotechnical Engineer will be required prior to concrete placement or utility installation.

B. Reconstruct subgrades damaged by freezing temperatures, frost, rain, accumulated water, or construction activities, as directed by the Owner's Representative.

3.9 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending indicated bottom elevation of concrete foundation or footing to excavation bottom, without altering required top elevation. Lean concrete fill may be used to bring elevations to proper position when acceptable to the Owner's Representative.
   1. Fill unauthorized excavations under other construction as directed by the Owner's Representative.

B. Where indicated widths of utility trenches are exceeded, provide stronger pipe, or special installation procedures, as required by the Owner or his Representative.

3.10 STORAGE OF SOIL MATERIALS

A. Stockpile excavated materials acceptable for backfill and fill soil materials. Stockpile soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent wind-blown dust.
   1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.11 BACKFILL

A. Backfill excavations promptly, but not before completing the following:
   1. Acceptance of construction below finish grade including, where applicable, damp proofing, waterproofing, and perimeter insulation.
   2. Surveying locations of underground utilities for record documents.
   3. Testing, inspecting, and approval of underground utilities.
   4. Concrete formwork removal.
   5. Removal of trash and debris from excavation.
   6. Removal of temporary shoring and bracing, and sheeting.
   7. Installing permanent or temporary horizontal bracing on horizontally supported walls.
   8. The Owner's Representative inspection.

3.12 UTILITY TRENCH BACKFILL

A. Place and compact bedding course on rock and other unyielding bearing surfaces and to fill unauthorized excavations. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints and fittings.

B. Concrete backfill trenches that carry below or pass under footings and that are excavated within 18 inches of footings. Place concrete to level of bottom of footings.

C. Provide 4 inch thick concrete base slab support for piping or conduit less than 30 inches below surface of roadways. After installation and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase.

D. Place and compact the first 12 inches of backfill of satisfactory soil material or subbase material, free of particles larger than 1/2 inch, to a height of 12 inches over the utility pipe or conduit.
   1. Carefully compact material under pipe haunches and bring backfill evenly up on both sides and along the full length of utility piping or conduit to avoid damage or displacement of utility system.

E. Coordinate backfilling with utilities testing.

F. Fill voids with approved backfill materials as shoring and bracing, and sheeting is removed.

G. Final backfill shall be in equal increments the length and girth of the trench line.

H. Backfilling of trenches shall be compacted with such equipment as may be required to obtain a minimum density of 95% of maximum dry density according to ASTM D 698 and as specified in Article "3.14 COMPACTION" of this Section.

I. The density tests shall be performed at various depths in the trench to insure that the minimum density is obtained throughout. For trenches of greater than 8 feet depth but less than 12 foot depth, density tests shall be taken at 1/2 the trench depth. For trenches of 12 foot depth or greater, density tests shall be taken at the 1/3 and 2/3 depth levels.

J. The frequency of density tests shall be a minimum interval of 500 lineal feet of mainline trench and at a minimum of one service line test per each 500 lineal feet of mainline installed. The number of density tests may be increased if directed by the Owner's Representative.

K. Trench lines shall be restored to the original grade. Any excess soil shall be piled on top of the trench and shall be well tamped. The premises should be left in clean condition and all rock and debris shall be removed from the site. Pavement or walk cuts shall be repaved with material identical to the original surfaces.

L. Install warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.13 FILL

A. Preparation: Remove vegetation, frozen soil, topsoil, debris, wet, and unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placing fills.
   1. Plow strip, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing surface.
   2. Fill areas shall be proof-rolled with a fully loaded tandem dump truck to help identify any soft or unsuitable areas. Areas identified as unsuitable shall be over excavated and reconstructed with engineered fill as specified in the subsurface investigations report.

B. When subgrade or existing ground surface to receive fill has a density less than that required for fill as determined by the Owner's Geotechnical Engineer, break up ground surface to depth required, pulverize, moisture-condition or aerate soil and recompact to required density.

   1. Place fill material in 8-inch thick layers to required elevations for each location listed below.
      a. Under grass, use satisfactory excavated or borrow soil material.
      b. Under walks and pavements, use base material.
      c. Under street pavements, asphaltic concrete pavements and slabs on grade, use required subbase material.
      d. Under steps and ramps, use subbase material.
      e. Under footings and foundations, use engineered fill as specified in the subsurface investigations report.

   2. Effective spreading equipment shall be used on each lift to obtain a uniform lift thickness prior to compaction.

   3. Fill layers shall be placed approximately parallel to the finished grade.

   4. Fill and subgrade construction shall not be started on foundation soil, partially completed fill, or subgrades that contain frost or ice.

3.14 MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill layer before compaction to within -2 to +2 percent of optimum moisture content as described by ASTM D 698.
   1. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.
   2. Remove and replace, or scarify and air-dry satisfactory soil material that is too wet to compact to specified density.
      a. Stockpile or spread and dry removed wet satisfactory soil material at location or locations approved by the Owner's Representative. Drying may be assisted by disking, harrowing, or pulverizing until the moisture content is reduced to a satisfactory value.

3.14 COMPACTION

A. Place backfill and fill materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers. Each lift shall be compacted to the minimum density specified.

B. Place backfill and fill materials evenly on all sides of structures to required elevations. Place backfill and fill uniformly along the full length of each structure.

C. Percentage of Maximum Dry Density Requirements: Compact soil lift to not less than the percentages of maximum dry density indicated below, according to ASTM D 698:
   1. Under structures, building slabs, steps, and pavements, compact the top 12 inches below subgrade and each layer of backfill or fill material at 95 percent maximum dry density.
   2. Under walkways, compact the top 6 inches below subgrade and each layer of backfill or fill material at 95 percent maximum dry density.
   3. Under lawn or unpaved areas, compact the top 6 inches below subgrade and each layer of backfill or fill material at 90 percent maximum dry density.

3.15 GRADING

A. General: Uniformly grade areas to a smooth surface, free from irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.
   1. Provide a smooth transition between existing adjacent grades and new grades.
   2. Cut out soft spots, fill low spots, and trim high spots to conform to required surface tolerances.

B. Site Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:
   1. Lawn or Unpaved Areas: Plus or minus 0.10 foot.
   2. Walks: Plus or minus 0.10 foot.
   3. Pavements: Plus or minus 1/2inch.

C. Grading Inside Building Lines: Finish subgrade to a tolerance of 1/2 inch when tested with a 10-foot straightedge.

3.16 SUBBASE AND BASE COURSES

A. Under pavements and walks, place subbase course material on prepared subgrades. Place base course material over subbases to pavements.
   1. Compact subbase and base courses at optimum moisture content to required grades, lines, cross sections and thickness to not less than 95 percent of ASTM D 698 relative density.
   2. Shape subbase and base to required crown elevations and cross-slope grades.
   3. When thickness of compacted subbase or base course is 6 inches or less, place materials in a single layer.
   4. When thickness of compacted subbase or base course exceeds 6 inches, place materials in equal layers, with no layer more than 6 inches thick or less than 3 inches thick when compacted.

3.17 DRAINAGE FILL

A. Under slabs-on-grade, place drainage fill course on prepared subgrade.
   1. Prior to placement of drainage fill, the entire slab area shall be proof-rolled with heavy construction equipment, such as a fully loaded tandem dump truck, to identify any isolated soft areas. Proof-rolling shall be performed in the presence of a qualified geotechnical engineer. If soft areas are identified, they shall be recompacted as engineered fill.
   2. The slab subgrade soils shall be prevented from drying excessively or becoming overly wet prior to or during construction of the floor slab. Should slab subgrade soils be found to be unsuitable or become disturbed by nature or construction activities, these areas shall be excavated to a solid base, the material reworked, recompacted, and regraded as controlled engineered fill as specified in the subsurface investigations report.
   3. Compact drainage fill to required cross sections and thickness.
   4. Drainage fill shall be a minimum of 6” thick free draining, granular fill.

3.18 FIELD QUALITY CONTROL

A. Testing Agency Services: Allow Owner's testing agency to inspect and test each subgrade and each fill or backfill layer. Do not proceed until test results for previously completed work verify compliance with requirements. Owner will only pay for those tests which pass; Design/Build Contractor shall pay for tests which do not pass.

1. When testing agency reports that subgrades, fills, or backfills are below specified density, scarify and moisten or aerate, or remove and replace soil to the depth required, recompact and retest until required density is obtained.

3.19 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and re-establish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or lose compaction due to subsequent construction operations or weather conditions.
1. Scarify or remove and replace material to depth directed by the Owner or his Representative; reshape and recompact at optimum moisture content to the required density.

C. Settling: Where settling occurs during the Project correction period, remove finished surfacing, backfill with additional approved material, compact, and reconstruct surfacing.
1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

3.20 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove surplus satisfactory soil to or owner designated area and waste material, including unsatisfactory soil, trash, and debris, and legally dispose of it off the Owner's property.

END OF SECTION 312000

SECTION 32 12 16 - HOT-MIX ASPHALT PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Hot-mix asphalt paving.
2. Hot-mix asphalt patching.
3. Pavement-marking paint.
4. Cold milling of existing hot-mix asphalt pavement.

B. Related Sections include the following:

1. Division 31 Section Site Clearing for saw-cutting of edges of existing pavement.
2. Division 31 Section "Earthwork" for aggregate subbase and base courses and aggregate pavement shoulders.
3. Division 32 Section Portland Cement Concrete Paving.
4. Division 32 Section "Paving Joint Sealants" for joint sealants and fillers at joints between concrete paving and asphalt paving.

1.3 SUBMITTALS

A. Product Data: For each product specified. Include technical data and tested physical and performance properties.

B. Material Certificates signed by material producer and Contractor, certifying that each material item complies with or exceeds specified requirements.

C. Job-Mix Designs: Certification, by authorities having jurisdiction, of approval of each job mix proposed for the Work.

D. Pavement marking plan indicating pavement markings, lane separations, and defined parking spaces shall be prepared by the Contractor. Indicate dedicated handicapped spaces with international graphics symbol.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Engage an experienced installer who has completed hot-mix asphalt paving similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.

B. Manufacturer Qualifications: Engage a firm experienced in manufacturing hot-mix asphalt similar to that indicated for this Project and with a record of successful in-service performance.

1. Firm shall be a registered and approved paving mix manufacturer with the Missouri Highway and Transportation Department.

C. Regulatory Requirements: Conform to Construction and material Specifications for Paving, Section 2200, Kansas City Metropolitan Chapter of American Public Works Association Standards and Specifications latest edition, together with the supplements issued by the Public Works Department for the City of Kansas City, Missouri.

D. Preinstallation Conference: Conduct conference at Project site. Review methods and procedures related to asphalt paving including, but not limited to, the following:

1. Review proposed sources of paving materials, including capabilities and location of plant that will manufacture hot-mix asphalt.
2. Review condition of substrate and preparatory work performed by other trades.
3. Review requirements for protecting paving work, including restriction of traffic during installation period and for remainder of construction period.
4. Review and finalize construction schedule for paving and related work. Verify availability of materials, paving Installer's personnel, and equipment required to execute the Work without delays.
5. Review inspection and testing requirements, governing regulations, and proposed installation procedures.
6. Review forecasted weather conditions and procedures for coping with unfavorable conditions.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver pavement-marking materials to Project site in original packages with seals unbroken and bearing manufacturer's labels containing brand name and type of material, date of manufacture, and directions for storage.

B. Store pavement-marking materials in a clean, dry, protected location and within temperature range required by manufacturer. Protect stored materials from direct sunlight.

1.6 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities and in accordance with Owner approved traffic control plan. Obtain street closure permit for work within public right-of-way.

B. Environmental Limitations: Do not apply asphalt materials if base is wet or contains an excess of moisture or if the following conditions are not met:

1. Prime and Tack Coats: Apply prime and tack coats when ambient temperature is above 50 deg F (10 deg C) and when temperature has not been below 35 deg F (1 deg C) for 12 hours immediately prior to application.
2. Asphalt Base Course: Air temperature above40 deg F and rising at time of placement.
3. Hot-mixed Asphalt Surface Course: Atmospheric temperature above60 deg F at time of placement and when base is dry.

C. Pavement-Marking Paint: Proceed with pavement marking only on clean, dry surfaces and at a minimum ambient or surface temperature of 40 deg F for oil-based materials, 50 deg F for water-based materials, and not exceeding 95 deg F.

D. Grade Control: Establish and maintain required lines and elevations.

PART 2 - PRODUCTS

2.1 AGGREGATES

A. General: Use locally available materials and gradations that comply with the requirements of the Kansas City Metropolitan Chapter APWA “Standard Specifications and Design Criteria” except as noted herein. Coarse Aggregate: Coarse aggregate shall be in accordance with MCIB Section 4 – paragraph 2, except that the total shale, clay, coal and lignite content shall not exceed 0.5 percent by weight.

B. Fine Aggregate: Fine aggregate shall be in accordance with MCIB Section 4- Paragraph 3.

2.2 ASPHALT-AGGREGATE MIXTURE

A. Hot-Mix Asphalt: Provide dense, hot-laid, hot-mix asphalt plant mixes complying with section 2200 of the Kansas City Metropolitan Chapter APWA “Standard Specifications and Design Criteria” and as recommended.
   1. Base Course: APWA Type 1-01.
   2. Surface Course: APWA Type 3-01.

2.3 ASPHALT MATERIALS

A. Asphalt Binder: AASHTO MP 1, PG 64-22.

B. Asphalt Cement: ASTM D 3381 for viscosity-graded material and ASTM D 946 for penetration-graded material.

C. Prime Coat: Asphalt emulsion prime complying with KCMO, APWA requirements.

D. Tack Coat: ASTM D 977, emulsified asphalt or ASTM D 2397, cationic emulsified asphalt, slow setting, diluted in water, of suitable grade and consistency for application.

E. Fog Seal: ASTM D 977, emulsified asphalt or ASTM D 2397, cationic emulsified asphalt, slow setting, factory diluted in water, of suitable grade and consistency for application.

F. Water: Potable.

G. Undersealing Asphalt: ASTM D 3141, pumping consistency.

2.4 AUXILIARY MATERIALS

A. Herbicide: Commercial chemical for weed control, registered by the EPA. Provide in granular, liquid, or wettable powder form.

B. Sand: ASTM D 1073, Grade Nos. 2 or 3.

C. Joint Sealant: ASTM D 3405, hot-applied, single-component, polymer-modified bituminous sealant.

D. Pavement-Marking Paint: Latex, waterborne emulsion, lead and chromate free, ready mixed, complying with FS TT-P-1952, with drying time of less than 3 minutes.

   1. Color: As indicated in the plan.

E. Glass Beads: AASHTO M 247, Type 1.

F. Wheel Stops: Precast, air-entrained concrete, 2500-psiminimum compressive strength, 4-1/2 inches high by 9 inches wide by 72 inches long. Provide chamfered corners and drainage slots on underside and holes for anchoring to substrate.

   1. Dowels: Galvanized steel, 3/4-inchdiameter, 10-inch minimum length.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that subgrade is dry, free from all loose and foreign material and compacted to 95 percent standard maximum density

B. Proof-roll subbase using heavy, pneumatic-tired rollers to locate areas that are unstable or need further compaction.

C. Where base is rough and uneven, a leveling course shall be placed and compacted to 95 percent standard maximum density prior to placement of asphalt pavement courses.

D. Notify Owner's Representative in writing of any unsatisfactory conditions. Do not begin paving installation until these conditions have been satisfactorily corrected.

3.2 SURFACE PREPARATION

A. General: Immediately before applying asphalt materials, remove loose and deleterious material from compacted subbase surfaces. Ensure that prepared subgrade is ready to receive paving.

1. Sweep loose granular particles from surface of unbound-aggregate base course. Do not dislodge or disturb aggregate embedded in compacted surface of base course.

B. Notify Owner's Representative of unsatisfactory conditions. Do not begin paving work until deficient subbase areas have been corrected and are ready to receive paving.

C. Herbicide Treatment: Apply herbicide according to manufacturer's recommended rates and written application instructions. Apply to dry, prepared subgrade or surface of compacted-aggregate base before applying paving materials.
1. Mix herbicide with prime coat if formulated by manufacturer for that purpose.

D. Prime Coat: Apply uniformly over surface of compacted subgrade or compacted-aggregate base at a rate of 0.15to 0.50 gal./sq. yd. Apply enough material to penetrate and seal, but not flood, surface. Allow prime coat to cure and dry a minimum of 72 hours or as long as necessary to attain penetration and evaporation of volatile.

1. If prime coat is not entirely absorbed within 24 hours after application, spread sand over surface to blot excess asphalt. Use just enough sand to prevent pickup under traffic. Remove loose sand by sweeping before pavement is placed and after volatiles have evaporated.
2. Protect primed subgrade from damage until ready to receive paving.

E. Tack Coat: Apply to contact surfaces of previously constructed asphalt or Portland cement concrete and surfaces abutting or projecting into hot-mixed asphalt pavement. Distribute at a rate of 0.05 to 0.15 gal. per sq. yd. of surface.
1. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.
2. Avoid smearing or staining adjoining surfaces, appurtenances, and surroundings. Remove spillages and clean affected surfaces.

3.3 HOT-MIX ASPHALT PLACING

A. Machine place hot-mix asphalt mix on prepared surface, spread uniformly, and strike off. Place asphalt mix by hand to areas inaccessible to equipment in a manner that prevents segregation of mix. Place each course to required grade, cross section, and compacted thickness.

1. Place hot-mix Type 1-01 asphalt base course in thickness of lifts not to exceed 4 inches.
2. Place hot-mix Type 5-01 asphalt surface course in single lift.
3. Regulate paver machine speed to obtain smooth, continuous surface free of pulls and tears in asphalt-paving mat.

B. Place paving in consecutive strips not less than 10 feet wide, unless otherwise acceptable to Owner or his Representative, and except where infill edge strips of a lesser width are required.

1. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete asphalt base course for a section before placing asphalt surface course.

C. Immediately correct surface irregularities in paving course behind paver. Use shovel or lute to remove excess material forming high spots. Fill depressions with hot-mix asphalt to prevent segregation of mix; use suitable hand tools to smooth surface.

3.4 JOINTS

A. Construct joints between old and new pavements, or between successive days□ work, to ensure continuous bond between adjoining paving sections. Construct joints free of depressions with same texture, density and smoothness as other sections of hot-mix asphalt course.

1. Clean contact surfaces and apply tack coat.
2. Offset longitudinal joints in successive courses a minimum of 6 inches.
3. Offset transverse joints in successive courses a minimum of 24 inches.
4. Compact joints as soon as hot-mix asphalt will bear roller weight without excessive displacement.
5. Compact asphalt at joints to a density within 2 percent of specified course density.

3.5 COMPACTION

A. General: Begin compaction as soon as placed hot-mix paving mixture will bear roller weight without excessive displacement. Compact hot-mix paving mixture with hot, hand tampers or vibratory-plate compactors in areas inaccessible to rollers.

1. Complete compaction before mix temperature cools to 185 deg F.

B. Breakdown Rolling: Accomplish breakdown or initial rolling immediately after rolling joints and outside edge. Examine surface immediately after breakdown rolling for indicated crown, grade, and smoothness. Repair displaced surfaces by loosening displaced material, filling with hot-mix asphalt, and rerolling to required elevations.

C. Intermediate Rolling: Begin intermediate rolling immediately after breakdown rolling, while hot-mix asphalt is still hot enough to achieve specified density. Continue rolling until hot-mix asphalt course has been uniformly compacted to the following density:

1. Base course shall have a minimum density of 95 percent. Surface course shall have a minimum density of 97 percent.

D. Finish Rolling: Finish roll paved surfaces to remove roller marks while hot-mix asphalt is still warm.

E. Edge Shaping: While surface is being compacted and finished, trim edges of pavement to proper alignment. Bevel edges while still hot, with back of rake or smooth iron. Compact thoroughly using tamper or other satisfactory method.

F. Repairs: Remove paved areas that are defective or contaminated with foreign materials. Remove paving course over area affected and replace with fresh, hot-mix asphalt. Compact by rolling to specified density and surface smoothness.

G. Protection: After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

H. Erect barricades to protect paving from traffic until mixture has cooled enough not to be damaged by traffic loads.

3.6 INSTALLATION TOLERANCES

A. Thickness: In-place compacted thickness tested in accordance with ASTM D-3549 will not be accepted if exceeding the following tolerances:

1. Base Course: Plus or minus ½ inch.
2. Surface Course: Plus 1/4 inch, no minus.

B. Surface Smoothness: Compact each course to produce a surface smoothness within the following tolerances as determined by using a 10-foot straightedge applied transversely or longitudinally to paved areas:

1. Base Course: 1/4 inch.
2. Surface Course: 1/8 inch.
3. Crowned Surfaces: Test with crowned template centered and at right angle to crown. Maximum allowable variance from template is 1/4 inch.

C. Check surface areas at intervals as directed by Owner's Representative.

3.7 PAVEMENT MARKING

A. Do not apply pavement-marking paint until layout, colors, and placement have been verified with Owner or his Representative.

B. Allow paving to cure for 30 days before starting pavement marking.

C. Cleaning: Sweep and clean surface to eliminate loose material and dust.

D. Apply paint with mechanical equipment to produce pavement markings of dimensions indicated with uniform, straight edges. Apply at manufacturer's recommended rates to provide a minimum of 12 to 15 mils dry thickness.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing agency to perform field inspections and tests and to prepare test reports.

1. Testing agency will conduct and interpret tests and state in each report whether tested Work complies with or deviates from specified requirements.
2. Contractor shall coordinate construction operations with Owner's testing agency.

B. Additional testing, at Contractor's expense, will be performed to determine compliance of corrected Work with specified requirements.

C. Thickness: In-place compacted thickness of hot-mix asphalt courses will be determined according to ASTM D 3549.

D. Surface Smoothness: Finished surface of each hot-mix asphalt course will be tested for compliance with smoothness tolerances.

E. In-Place Density: Samples of uncompacted paving mixtures and compacted pavement will be secured by testing agency according to ASTM D 979.

1. Reference laboratory density will be determined by averaging results from 4 samples of hot-mix asphalt-paving mixture delivered daily to site, prepared according to ASTM D 1559, and compacted according to job-mix specifications.
2. In-place density of compacted pavement will be determined by testing core samples according to ASTM D 1188 or ASTM D 2726.

    a. Field density of in-place compacted pavement may also be determined by nuclear method according to ASTM D 2950 and correlated with ASTM D 1188 or ASTM D 2726.

F. Repair, or remove and replace, or install additional hot-mix asphalt where test results or measurements indicate that it does not comply with specified requirements as directed by Owner's Representative.

END OF SECTION 321216

SECTION 32 13 13 - PORTLAND CEMENT CONCRETE PAVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes exterior portland cement concrete paving for the following:
1. Curbs and gutters.
2. Walkways.
3. Driveways.
4. Entrances

B. Related Sections: The following Sections contain requirements that relate to this Section:
1. Division 31 Section "Earthwork" for subgrade preparation, grading and subbase course.
2. Division 03 Section "Cast-in-Place Concrete" for general building applications of concrete.
3. Division 32 Section "Paving Joint Sealants" for joint fillers and sealants within concrete paving and at joints with adjacent construction.

1.3 SUBMITTALS

A. General: Submit the following according to the Conditions of the Contract and Division 01 Specification Sections.

B. Product data for proprietary materials and items, including reinforcement and forming accessories, admixtures, joint systems, curing compounds, dry-shake finish materials, and others.

C. Design mixes for each class of concrete. Include revised mix proportions when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

D. Pavement marking plan indicating lane separations and defined parking spaces will be prepared by the Contractor. Show dedicated handicapped spaces with international graphics symbol.

E. Laboratory test reports for evaluation of concrete materials and mix design tests.

F. Minutes of preinstallation conference.

1.4 QUALITY ASSURANCE

A. Concrete Standards: Comply with provisions of the following standards, except where more stringent requirements are indicated.
1. American Concrete Institute (ACI) 301, "Specifications for Structural Concrete for Buildings."
2. Midwest Concrete Industry Board (MCIB).
3. Concrete Reinforcing Steel Institute (CRSI) "Manual of Standard Practice."
4. Missouri Standard Specifications for Highway Construction, Section 501 Concrete.
5. Comply with applicable requirements of Kansas City Metropolitan Chapter, American Public Works Association, “Standard Specifications and Design Criteria – Division II; “Construction and Material Specifications for Paving” Section 2200 and “Incidental Construction” Section 02300.
a. Comply with applicable requirements of the City of Kansas City, Missouri, Department of Public Works, Engineering Division, “Standard Specifications and Design Criteria-Division II, “Construction and Material Specifications” (APWA), Section 2200 and Section 02500 and “Standard Drawings” for work in the public right-of-way

B. Concrete Manufacturer Qualifications: Manufacturer of ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

C. Concrete Testing Service: Engage a qualified independent testing agency to perform materials evaluation tests and to design concrete mixes.

D. Preinstallation Conference: Conduct conference at Project site.
1. Before installing portland cement concrete paving, meet with representatives of authorities having jurisdiction, Owner and his Representative, consultants, independent testing agency, and other concerned entities to review requirements. Notify participants at least 3 working days before conference.

1.5 PROJECT CONDITIONS

A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities and in accordance with Owner approved Traffic Control Plan.

B. Do not place concrete when subgrade, forms or equipment are wet or frozen or contain ice or snow. Cold weather concrete work, when the air temperature is below 40 degrees F., shall conform to MCIB Standard Concrete Specification, Section 10.

C. Hot weather concrete work, when the air temperature is above 80 degrees F., shall conform to MCIB Standard Concrete Specification, Section 11.

PART 2 - PRODUCTS

2.1 FORMS

A. Form Materials: Plywood, metal, metal-framed plywood, or other acceptable panel-type materials to provide full-depth, continuous, straight, smooth exposed surfaces.
1. Use flexible or curved forms for curves of a 100-foot or less radius.
2.

B. Form Release Agent: Provide commercial formulation form-release agent with a maximum of 350 g/L volatile organic compounds (VOCs) that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

2.2 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Reinforcement Bars: ASTM A 615, Grade 60, deformed.

C. Joint Dowel Bars: Plain steel bars, ASTM A 615, Grade 60. Cut bars true to length with ends square and free of burrs.

D. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcement bars, welded wire fabric, and dowels in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:
1. Equip wire bar supports with sand plates or horizontal runners where base material will not support chair legs.

2.3 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or II.

B. Coarse aggregate shall conform to MCIB, Section 4. Only limestone from the Bethany Falls or Calloway ledges shall be used.

C. Fine aggregate shall conform to MCIB Section 4.

D. Water: Potable.

2.4 ADMIXTURES

A. Provide concrete admixtures that do not contain chloride ions.

B. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range Water-Reducing Admixture: ASTM C 494, Type F or Type G.

E. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.5 CURING MATERIALS

A. Liquid membrane curing compound for use on pavement, curb and gutter, sidewalk and driveways shall conform to one of the following types:
1. A non-pigmented, two component water insensitive epoxy having a solid epoxy content of 40 to 60 percent. The application rate is 5 to 8 mils wet.
2. A liquid system of styrene acrylate Type I – Class 2 or liquid chlorinated rubber Type II – Class 2, complying with Federal Specification No. TT-C-800A. the application rate shall be 6 to 10 mils wet.
3. A fan pattern spray nozzle shall be used when applying liquid curing membrane.

2.6 RELATED MATERIALS

A. Traffic Paint: Alkyd-resin ready-mixed, complying with AASHTO M 248, Type N.
1. Color: White.
2. Color: Yellow.
3. Color: Blue

2.7 JOINT MATERIALS

A. Expansion Joint Materials:
1. Expansion Material: Preformed, one-piece, non-extruding material.
   a. Products: Subject to compliance with requirements, provide one of the following:
      1) “bondex” No. 941, or “Rubatex”; Rubatex Co., or “Homex”; Homasote Co.
2. Joint Sealer: One component, gun-grade, moisture cured epoxy or urethane.
   a. Products: Subject to compliance with requirements, provide one of the following:
      1) “Vulkem 45”; Mameco International Inc.
      2) “Sikaflex-1a”; Sika Chemical Corp.
      3) “Pecora GC-9”; Pecora Co.

2.8 CONCRETE MIXES

A. Portland cement concrete used in construction of concrete pavement shall conform to MCIB Mix No. WA658-1-2-0.365 or WA561-1-2-0.410.

B. Portland cement concrete used in construction of concrete curb and gutter shall conform to MCIB Mix No. WA610-1-4-0.410.

C. Portland cement concrete used in construction of concrete sidewalk shall conform to MCIB Mix WA610-1-4-0.410.

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Comply with requirements and with ASTM C 94. When air temperature is between 85 deg F (30 deg C) and 90 deg F (32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Verify that the subgrade has been cut filled and compacted as required to achieve the lines, grades and cross sections shown on the plans within a tolerance of ¼ inch from plan elevation.

B. Proof-roll prepared subbase surface to check for unstable areas and verify need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving. Verify that the top six (6) inches of subgrade is compacted to 95 percent of maximum density per ASTM D-698.

C. Remove loose material from compacted subbase surface immediately before placing concrete.

3.2 EDGE FORMS AND SCREED CONSTRUCTION

A. Set, brace, and secure edge forms, bulkheads, and intermediate screed guides for paving to required lines, grades, and elevations. Install forms to allow continuous progress of work and so that forms can remain in place at least 24 hours after concrete placement.

B. Check completed formwork and screeds for grade and alignment to following tolerances:
1. Top of Forms: Not more than 1/8 inch in 10 feet.
2. Vertical Face on Longitudinal Axis: Not more than 1/4 inch in 10 feet.

C. Clean forms after each use and coat with form release agent as required to ensure separation from concrete without damage.

3.3 PLACING REINFORCEMENT

A. Place reinforcement as indicated in the details and typical sections in the plans.

B. Interrupt reinforcement at expansion joints.

C. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

D. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

3.4 PAVEMENT JOINTS

A. General: Construct contraction, construction, and isolation joints true to line with faces perpendicular to surface plane of concrete. Construct transverse joints at right angles to the centerline, unless indicated otherwise.
1. When joining existing paving, place transverse joints to align with previously placed joints, unless indicated otherwise.

B. Contraction Joints: Provide weakened-plane contraction joints, sectioning concrete into areas as shown on Drawings. Construct contraction joints for a depth equal to at least 1/4 of the concrete thickness, to be completed within 12 hours after pour, as follows:

1. Tooled Joints: Form contraction joints in fresh concrete by grooving and finishing each edge of joint with a radiused jointer tool.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into hardened concrete when cutting action will not tear, abrade, or otherwise damage surface and before development of random contraction cracks.
3. Contraction joints in street pavement shall be sawed joints.
4. Installation of joint fillers and sealants is specified in Division 7, Section 07905 Paving Joint Sealants.

C. Construction Joints: Set construction joints at side and end terminations of paving and at locations where paving operations are stopped for more than □ hour, unless paving terminates at isolation joints.
1. Provide preformed galvanized steel or plastic keyway-section forms or bulkhead forms with keys, unless indicated otherwise. Embed keys at least 1-1/2 inches into concrete.
2. Continue reinforcement across construction joints unless indicated otherwise. Do not continue reinforcement through sides of strip paving unless indicated.
3. Provide tie bars at sides of paving strips where indicated.
4. Use bonding agent on existing concrete surfaces that will be joined with fresh concrete.
5. Installation of joint fillers and sealants is specified in Division 7, Section 07905 Paving Joint Sealants.

D. Isolation Joints: Form isolation joints of preformed joint filler strips abutting concrete curbs, catch basins, manholes, inlets, structures, walks, other fixed objects, and where indicated.
1. Locate expansion joints at intervals of 30 feet, unless indicated otherwise.
2. Extend joint fillers full width and depth of joint, not less than 1/2 inch or more than 1 inch below finished surface where joint sealant is indicated. Place top of joint filler flush with finished concrete surface when no joint sealant is required.
3. Furnish joint fillers in one-piece lengths for full width being placed wherever possible. Where more than one length is required, lace or clip joint filler sections together.
4. Protect top edge of joint filler during concrete placement with a metal, plastic, or other temporary preformed cap. Remove protective cap after concrete has been placed on both sides of joint.
5. Installation of joint fillers and sealants is specified in Division 7, Section 07905 Paving Joint Sealants.

E. Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt-coat one half of dowel length to prevent concrete bonding to one side of joint.

3.5 CURB JOINTS

A. Joints shall be formed at right angles to the alignment of the curb as specified in the details on the plans

B. Expansion joints shall be placed at all radius points, driveways, curb inlets and any additional locations directed by the Engineer.

C. Expansion joints shall be formed using a one piece, 3/4 inch thick preformed joint filler cut to the configuration of the curb section.

D. Expansion joint material shall be secured to prevent any displacement during concrete placement, consolidation and finishing.

E. Joint edges shall be rounded with a 1/4 inch radius edging tool.

F. Curbs shall have one inch deep contraction joints at intervals of not less than 10 feet and not greater than 20 feet. The contraction joints shall extend across the entire curb section to one inch below the pavement surface and may be formed by one of the following methods.

G. Contraction joints may be formed using a 1/8 inch metal template cut to the configuration of the curb section. Secure templates in place to prevent them from being disturbed. The templates shall remain in place until the concrete has attained its initial set and finishing is completed.

H. Contraction joints may be tooled to the specified depth. All exposed joint edges shall be given a 1/4 inch radius.

I. Sawed contraction joints may be cut when a curb machine has been used. Joints must be sawed within 24 hours of curb placement.

J. Joint sealer is not required for contraction joints.

3.6 SIDEWALK AND DRIVEWAY JOINTS

A. Joints shall be formed at right angles to the alignment of the sidewalk and driveway according to the details in the plans.

B. Sidewalks shall have traverse joints spaced at a distance equal to the sidewalk width. Sidewalks greater than 6 feet in width shall be divided by longitudinal joints spaced not less than 30 inches or greater than 48 inches with the traverse joints at the same spacing to form a square pattern.

C. Driveways wider than 20 feet shall have a traverse joint in the center.

D. Expansion joints shall be located as indication in the details.

E. Expansion joints shall be formed using a one piece, 1/2 inch thick preformed joint filler cut to match the cross section of the sidewalk or driveway. The joint material shall be left 1/2 inch below the pavement surface or a tear strip provided to allow for application of joint sealer.

F. Secure joint material to prevent any displacement during concrete placement, consolidation and finishing.

G. Round joint edges with a 1/4 inch radius edging tool.

H. Contraction joints for sidewalks and driveways shall be one inch deep and 1/8 inch wide with edges rounded by a 1/4 inch radius edging tool. The edger marks shall be left on all sidewalks and driveways.

I. Contraction joints may be sawed with the approval of the Engineer.

J. Joint sealer is not required for contraction joints.

3.7 CONCRETE PLACEMENT

A. Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel, and items to be embedded or cast in. Notify other trades to permit installation of their work.

B. Remove snow, ice, or frost from subbase surface and reinforcing before placing concrete. Do not place concrete on surfaces that are muddy or frozen.

C. Moisten subbase to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are at the required finish elevation and alignment.

D. Comply with requirements and with APWA Section 2200 for measuring, mixing, transporting, and placing concrete.

E. Deposit and spread concrete in a continuous operation between transverse joints. Do not push or drag concrete into place or use vibrators to move concrete into place.
   1. When concrete placing is interrupted for more than □ hour, place a construction joint.

F. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

G. Consolidate concrete by mechanical vibrating equipment supplemented by hand-spading, rodding, or tamping. Use equipment and procedures to consolidate concrete complying with APWA Section 2200.
   1. Consolidate concrete along face of forms and adjacent to transverse joints with an 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 dislocating reinforcing, dowels, and joint devices.

H. Screed paved surfaces with a straightedge and strike off. Use bull floats or darbies to form a smooth surface plane before excess moisture or bleed water appears on the surface. Do not further disturb concrete surfaces prior to beginning finishing operations.

I. Curbs and Gutters: When automatic machine placement is used 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.

J. Slip-Form Pavers: When automatic machine placement is used for paving produce paving to required thickness, lines, grades, finish, and jointing as required for formed paving.
1. Compact subbase and prepare subgrade of sufficient width to prevent displacement of paver machine during operations.

K. When adjoining pavement lanes are placed in separate pours, do not operate equipment on concrete until pavement has attained 85 percent of its 28-day compressive strength.

L. Cold-Weather Placement: Comply with provisions of MCIB Section 4 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When air temperature has fallen to or is expected to fall below 40 deg F (4 deg C), uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F (10 deg C) and not more than 80 deg F (27 deg C) at point of placement.
2. Do not use frozen materials or materials containing ice or snow.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise accepted in mix designs.

M. Hot-Weather Placement: Place concrete complying with MCIB Section 4 and as specified when hot weather conditions exist.
1. Cool ingredients before mixing to maintain concrete temperature at time of placement to below 90 deg F (32 deg C). 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.
2. Cover reinforcing steel with water-soaked burlap if it becomes too hot, so that steel temperature will not exceed the ambient air temperature immediately before embedding in concrete.
3. Fog spray forms, reinforcing steel, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.8 CONCRETE FINISHING

A. Float Finish: Begin floating when bleed water sheen has disappeared and the concrete surface has stiffened sufficiently to permit operations. Float surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Finish surfaces to true planes within a tolerance of 1/4 inch in 10 feet as determined by a 10-foot-long straightedge placed anywhere on the surface in any direction. Cut down high spots and fill low spots. Refloat surface immediately to a uniform granular texture. Do not use wood floats.
1. Sidewalks and Ramps:
a. Medium Broom Finish: Draw a stiff broom or other approved method across concrete surface perpendicular to line of traffic to produce an even, gritty texture.
2. Roadways and Driveways:
a. Medium-to-Coarse-Textured Broom Finish: Provide a coarse finish by striating surface 1/16 inch to 1/8 inch deep with a stiff-bristled broom, perpendicular to line of traffic.

B. Final Tooling: Tool edges of paving, gutters, curbs, and joints formed in fresh concrete with a jointing tool to the following radius. Repeat tooling of edges and joints after applying surface finishes. Eliminate tool marks on concrete surfaces.
1. Radius: 1/4 inch.

C. Nonslip Aggregate Finish: Apply exposed aggregate finish to curb cuts.

3.9 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of MCIB Section 4 for cold weather and for hot weather protection during curing.

B. Evaporation Control: In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.

C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

D. Curing Methods: Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
1. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

3.10 TRAFFIC PAINT

A. Cleaning: Sweep and clean surface to eliminate loose material and dust.

B. Striping: Use alkyd resin type traffic lane-marking paint, factory-mixed, quick-drying, and non-bleeding.

C. Do not apply traffic and lane marking paint until layout and placement have been verified with Owner’s Representative.

D. Traffic Paint: Apply traffic paint for striping and other markings with mechanical equipment to produce uniform straight edges. Apply at manufacturer's recommended rates to provide a 15-mil minimum wet film thickness.

3.11 FIELD QUALITY CONTROL TESTING

A. The Owner will employ a qualified testing and inspection agency to sample materials, perform tests, and submit test reports during concrete placement. Sampling and testing for quality control may include the following:
1. Sampling Fresh Concrete: ASTM C 172, except modified for slump to comply with ASTM C 94.
a. Slump: ASTM C 143; one test at point of placement for each compressive-strength test but no less than one test for each day's pour of each type of concrete. Additional tests will be required when concrete consistency changes.
b. Air Content: ASTM C 231, pressure method; one test for each compressive-strength test but no less than one test for each day's pour of each type of air-entrained concrete.
c. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F (4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each set of compressive-strength specimens.
d. Compression Test Specimens: ASTM C 31; one set of four standard cylinders for each compressive-strength test, unless directed otherwise. Mold and store cylinders for laboratory-cured test specimens except when field-cured test specimens are required.
e. Compressive-Strength Tests: ASTM C 39; one set for each day's pour of each concrete class exceeding 5 cu. yd. but less than 25 cu. yd., plus one set for each additional 50 cu. yd. Test one specimen at 7 days, test two specimens at 28 days, and retain one specimen in reserve for later testing if required.
2. When frequency of testing will provide fewer than five strength tests for a given class of concrete, conduct testing from at least five randomly selected batches or from each batch if fewer than five are used.

B. Test results will be reported in writing to Owner or his Representative, concrete manufacturer, and Contractor within 24 hours of testing. Reports of compressive strength tests shall contain the Project identification name and number, date of concrete placement, name of concrete testing agency, concrete type and class, location of concrete batch in paving, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for both 7-day and 28-day tests.

C. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted but shall not be used as the sole basis for acceptance or rejection.

D. Additional Tests: The testing agency will make additional tests of the concrete when test results indicate slump, air entrainment, concrete strengths, or other requirements have not been met, as directed by the Owner or his Representative. Testing agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42, or by other methods as directed.

3.12 REPAIRS AND PROTECTION

A. Remove to the nearest joint and replace concrete paving that is broken, damaged, or defective, or does not meet the requirements of this Section.

B. Drill test cores where directed by Owner or his Representative when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with portland cement concrete bonded to paving with epoxy adhesive.

C. Protect concrete from damage until accepted by the Owner. Exclude traffic from paving until it has achieved 70 percent of the 28 day compressive design strength. When construction traffic is permitted, maintain paving as clean as possible by removing surface stains and spillage of materials as they occur.

D. Maintain concrete paving free of stains, discoloration, dirt, and other foreign material. Sweep concrete paving not more than 2 days prior to date scheduled for Substantial Completion inspections.

END OF SECTION 321313

SECTION 32 13 73 - CONCRETE PAVEMENT JOINT SEALANT

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Sealing control and expansion joints in concrete sidewalks, parking lots, and driveways.

B. Drawings and General Provisions of Contract, including General and Special Conditions, apply to this section.

1.2 WORK INCLUDED

A. Work under this section includes providing all labor, material, and equipment to seal the contraction, control, and expansion joints in concrete sidewalk, parking lot, and driveway pavements.

PART 2 - PRODUCTS

2.1 EXPANSION JOINT MATERIAL

A. Expansion joint material shall be 1/2” thick, full depth, pre-molded non-bituminous joint material, with the top 1/2" perforated for removal prior to sealing operations.

2.2 JOINT FILLER

A. One or two component polysulfide polymer sealant or a one or two component polyurethane prepolymer sealant.

B. Color: Gray.

2.3 BACKER ROD

A. Closed cell polyethafoam sealant backer rod. Sized as required.

PART 3 - EXECUTION

3.1 PREPARATION

A. Control joints are to be sawed in accordance with the drawings and specifications.

B. Seal joints following the sawing operation or as soon as possible thereafter.

3.2 GENERAL

A. Manufacturer's recommendations on the joint sealer shall be strictly adhered to with the following additions:

1. Joint sealant shall be left approximately 1/16" below the pavement surface level to prevent tracking.
2. Sprinkle fine silica sand, as needed, to reduce tracking of the joint sealer.

C. Pedestrian traffic shall be maintained as follows on sidewalks unless closure is authorized by the Owner’s Representative. In no case will tracking of the joint material be tolerated.

1. The Contractor may close off one-half the sidewalk width to pedestrian traffic while sealant cures.
2. Contractor may place a board, notched on the bottom side with the notch centered over the joint and held securely in place with sandbags.

3.3 INSTALLATION

A. Remove the perforated portion of the expansion joint material prior to placing the joint sealant.

B. Clean all loose material from the joints with compressed air.

C. In contraction joints, place a polyethafoam sealant backer rod of 5/16" to 3/8" below the surface elevation of the sidewalk. The backer rod must be uniformly installed depth-wise.

D. Install expansion and construction joint sealant to approximately 1/16" below the sidewalk surface level.

END OF SECTION 321373

SECTION 33 46 00 - SUBDRAINAGE

1.1 PRODUCTS

A. Piping: Perforated PE pipe and fittings; NPS 6 (DN 150) and Smaller; ASTM F 405 or AASHTO M 252, Type CP.
B. Drainage Panels: Section 07 10 00 "Waterproofing.
C. Soil materials: Per Section 31 20 00 "Earth Moving."
D. Geotextile filter fabrics: Fabric of PP or polyester fibers or combination of both; flow rate range from 110 to 330 gpm/sq. ft. (4480 to 13 440 L/min. per sq. m) and flat and sock styles.

1.2 FOUNDATION DRAINAGE INSTALLATION

A. Place and compact impervious fill material on subgrade adjacent to bottom of footing to dimensions not less than 6 inches (150 mm) deep and 12 inches (300 mm) wide.
B. Lay flat-style geotextile filter fabric in trench and overlap trench sides. Place compacted layer of drainage course not less than 4 inches (100 mm)over compacted subgrade and geotextile filter fabric.
C. Encase pipe with sock-style geotextile filter fabric connect sock sections with adhesive.
D. Separate 4 inches (100 mm) of fabric of drainage panel at beginning of roll and cut away 4 inches (100 mm) of core. Wrap fabric around end of remaining core.
E. Attach panels to wall beginning at subdrainage pipe with geotextile facing away from wall per Section 07 10 00 "Waterproofing. Place drainage course to width of at least 6 inches (150 mm) away from wall and to top of pipe. Perform tests.
F. After satisfactory testing, cover piping with drainage course to width of at least 6 inches (150 mm) on side away from footing and to within 12 inches (300 mm) of finish grade. Wrap top of drainage course with flat-style geotextile filter fabric, overlapping edges at least 4 inches (100 mm).
G. Place backfill material over compacted drainage course in loose-depth layers not exceeding 6 inches (150 mm) t thoroughly compactiing each layer.

1.3 UNDERSLAB DRAINAGE INSTALLATION

A. Excavate for underslab drainage system in compacted subgrade material with horizontal distance of at least 6 inches (150 mm) between drainage pipe and trench walls. Grade bottom of trench excavations to required slope, and compact.
B. Lay flat-style geotextile filter fabric in trench and overlap trench sides. Place compacted layer of drainage course not less than 4 inches (100 mm) over subgrade and geotextile filter fabric.
C. Encase pipe with sock-style geotextile filter fabric connecting sock sections with [**adhesive**] [**or**] [**tape**]. Add drainage course to width of at least 6 inches (150 mm) away from wall and to top of pipe. Perform tests.
D. After satisfactory testing, cover drainage piping with drainage course to elevation of bottom of slab, and compact and wrap top of drainage course with flat-style geotextile filter fabric.

END OF SECTION 33 46 00