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**DIVISION 32 - EXTERIOR IMPROVEMENTS**

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**DIVISION 33 - UTILITIES**

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**DIVISION 34 - TRANSPORTATION**

**NOT APPLICABLE**

**END OF SECTION**
SECTION 002600 - PROCUREMENT SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Requirements for substitution requests made during procurement.

B. Related Sections:
   1. Section 012500 - Substitution Procedures: For requirements for substitution requests made after Contract award.

1.2 DEFINITIONS

A. Bidder: Entity or individual authorized to submit a bid in accordance with the Bidding Documents with the intention and ability to enter into an agreement with the Owner to perform the Work.

B. Procurement Substitution Requests: Requests for changes in products, materials, equipment, and methods of construction from those indicated in the Procurement and Contracting Documents, submitted prior to receipt of bids.

1.3 PROCUREMENT SUBSTITUTIONS

A. Procurement Substitutions, General: By submitting a bid, the Bidder represents that its bid is based on materials and equipment described in the Procurement and Contracting Documents.

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

END OF SECTION
SECTION 002601 – PROCUREMENT SUBSTITUTION REQUEST FORM

TO:  NBBJ, 1555 Lake Shore Drive Columbus Ohio.
    Attn: Tracy Perry.

FROM:  <Insert Bidder name>

Specification Section: <00 0000 - Section Title>  

Article and Paragraph(s):  

Specified Item:  

Proposed Substitution:  

PART 1 - Required documentation for proposed substitution is attached, in accordance with Section 002600 – Procurement Substitution Procedures.

The Undersigned certifies that the proposed substitution meets requirements stipulated in Section 002600 – Procurement Substitution Procedures.

Submitted By (Bidder):  

Signature  Date  

Printed Name and Title  

END OF SECTION
SECTION 003132 - GEOTECHNICAL DATA

PART 1 - GENERAL

1.1 GEOTECHNICAL DATA

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner’s information for Bidders’ convenience and are intended to supplement rather than serve in lieu of Bidders’ own investigations. They are made available for Bidders’ convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. Soil-boring data for Project, obtained by Geotechnical Consultants Inc., dated January 10, 2017, is available for viewing at the office of Construction Manager.

C. A geotechnical investigation report for Project, prepared by Geotechnical Consultants Inc., dated January 10, 2017, is available for viewing at the office of Construction Manager.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION
“This electronic communication and its contents may contain confidential information which is the exclusive property of Geotechnical Consultants, Inc. The recipient(s) assumes all liability arising from any alteration, misuse or unauthorized distribution. If you have received this information in error, please notify the sender immediately.”
Subsurface Exploration and Geotechnical Engineering Report

Columbus Metropolitan Library
Dublin Branch Expansion
West North Street
Dublin, Ohio

Prepared for:
Columbus Metropolitan Library

January 10, 2017
January 10, 2017

Ms. Wendy Tressler  
CML 2020 Vision Manager  
Columbus Metropolitan Library  
96 South Grant Avenue  
Columbus, Ohio 43215

Reference: Subsurface Exploration and Geotechnical Engineering Report  
Columbus Metropolitan Library Dublin Branch Expansion  
West North Street – Dublin, Ohio  
GCI Project No. 16-G-20433

Dear Ms. Tressler:

As you authorized on behalf of the Columbus Metropolitan Library, Geotechnical Consultants, Inc. has performed a subsurface exploration and prepared a geotechnical report for the above referenced project. Our borings generally encountered a surface cover consisting of asphalt, fill, and topsoil overlying natural clay-based soils and limestone bedrock. Rock was encountered in the borings at 0.4 to 5 feet with auger refusal at 2.7 to 5.8 feet below existing grades. We did not encounter seepage in the borings, and subgrades were generally moist.

Based on our findings, it is our opinion that the encountered site soils are suitable to support the proposed building. The primary geotechnical consideration is the depth to bedrock with regard to site excavations. Other geotechnical issues that will affect the project are site stripping including removal of existing construction, subgrade preparation, and proper placement and compaction of good quality structural fill. We discuss geotechnical considerations in more detail in the report.

After you have reviewed the report, please contact us with any questions you may have. We appreciate the opportunity to provide our services for this project and hope to continue providing our services through construction.

Respectfully submitted,  
Geotechnical Consultants, Inc.

Kevin M. O’Connor, P.E.  
Senior Project Manager

Curtis L. Miller, P.E.  
In-house Reviewer

Distribution: Ms. Wendy Tressler @ Columbus Metro Library – pdf via email  
Mr. Carlo Burns @ Pizzuti Companies – pdf via email  
GCI File – 1 bound copy
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General Site Location Map (DeLorme Street Atlas USA 2014)  
Boring Location Plan  
Cross Section Profile  
Summary of Encountered Subsurface Conditions  
Test Boring Logs (B-1 to B-5)
INTRODUCTION

As requested by Mr. Carlo Burns of the Pizzuti Companies, and authorized by Ms. Wendy Tressler on behalf of the Columbus Metropolitan Library (CML), Geotechnical Consultants, Inc. (GCI) completed a subsurface exploration and prepared this geotechnical engineering report for the proposed CML Dublin Branch Expansion in Dublin, Ohio. The client provided GCI with a ALTA Survey (2/13/15) and Grading Exhibit with topographic information (3/3/15), both prepared by EMH&T, Inc. The client also provided a Geotech Site Plan (11/23/16) prepared by nbbj showing the proposed site development.

Our study consisted of five (5) standard penetration test borings, in the proposed building footprint, around the existing building. Borings were located in reference to existing site landmarks. A site plan showing approximate boring locations and copies of the boring logs are attached in the appendix. GCI interpolated ground surface elevations at the boring locations based on the provided topographic map. GCI did not verify these ground surface elevations in the field.

The intent of this study was to evaluate subsurface conditions at the site and to offer recommendations relative to subgrade/earthwork preparation, foundations, slabs, and below grade walls. We issue this report prior to the receipt of final site layout and grading plans. GCI should review these plans when available, and provide additional recommendations, if necessary.

GCI prepared this report for the exclusive use of the Columbus Metropolitan Library and their consultants for specific application to the above referenced project in Dublin, Ohio in accordance with generally accepted soil and foundation engineering practices. We make no warranty, expressed or implied.
SITE LOCATION AND PROJECT DESCRIPTIONS

The site is located in the northwest quadrant of the intersection of N. High Street and W. North Street in Dublin, Ohio. A Site Location Map (DeLorme Street Atlas USA) is attached in the Appendix.

The site is occupied by the existing library building with a paved parking area south of the building. There are landscaped grass-covered and wooded areas on the west, north and east sides of the building. Topographically, the area is gently rolling terrain with existing grades ranging from Elevation 823 feet on the east side of the building along N. High Street up to Elevation 834 feet on the west side of the building. The aerial photograph below shows site conditions generally similar to those encountered during our drilling operations.

Aerial Photograph with Approximate Expansion Footprint (Google Earth 2017)

The proposed project will include partial removal of the existing building. The City of Dublin will also be constructing roads along the north portion of the site, and a parking structure will be constructed in the west portion of the site.
The expanded building will have a south entrance at Elevation 835 feet to 836 feet, and a northeast entrance at Elevation 823 feet. This will require cuts up to 10 feet in the north portion of the proposed expansion, and fill up to 5 feet in the south portion.

**SUBSURFACE CONDITIONS**

GCI mobilized a truck-mounted, rotary drill rig (CME-45 with automatic sampling hammer) to the site on January 6, 2017. We drilled four standard penetration borings (B-1 to B-3, and B-5) in accessible areas around the existing building to depths of 2.7 to 5.8 feet below grade. The borings terminated with auger refusal in limestone at depths of 2.7 to 5.8 feet. We performed a hand auger boring (B-4) on the east side of the existing building to a depth of 0.8 feet which terminated in limestone.

Boring logs and a boring location plan are attached in the appendix. We summarize the subsurface findings in the attached table, in the attached cross section profile, and in the following paragraphs. Refer to the individual boring logs for more detailed subsurface information at specific boring locations.

**Surface Cover**

Borings B-1 and B-2 were drilled in the paved parking area and encountered 4 to 6 inches of asphalt over 3 to 9 inches of stone.

Boring B-4 encountered topsoil that was 0.4 feet thick.

Below the pavement in boring B-2 and on the surface in borings B-3 and B-5, we encountered fill. In borings B-2 and B-5, the fill was comprised primarily of medium stiff
brown lean clay with trace amounts of topsoil, gravel, and brick fragments that extended to depths of 1.5 to 2 feet. In boring B-3, the fill consisted of loose silty sand with gravel and stone that extended to a depth of 3 feet below existing grade.

**Natural Soils**

Below the surface cover in borings B-1 to B-3, we encountered brown lean clay (CL under the ASTM/Unified Soil Classification System) of moderate plasticity. The clay extended to depths of 1.7 to 5 feet below existing grades, and based on standard penetration test N-values, it was stiff in cohesive consistency.

**Bedrock**

We encountered limestone bedrock in the borings at depths of 0.4 to 5 feet below existing grades. Borings B-1 to B-3, and B-5 terminated with auger refusal at depths of 2.7 to 5.8 feet. Hand auger boring B-4 terminated in limestone at a depth of approximately 0.8 feet.

**Groundwater and Soil Moisture Conditions**

We did not encounter water seepage during drilling, or upon completion of drilling. We generally described the retrieved soil samples as moist. Note that groundwater levels and moisture conditions can vary with changes in season and in response to precipitation events.

**ANALYSES AND CONCLUSIONS**

**GEOTECHNICAL EVALUATION**

Based on the information from our borings, it is GCI's opinion that the site geotechnical conditions are suitable for the proposed development. The primary geotechnical
consideration for the project will be the depth to bedrock with regard to site excavations. Other typical geotechnical considerations for site development include removal of existing construction and surface cover, subgrade stabilization as needed, and proper placement and compaction of good quality structural fill. Provided the site is prepared as described herein, it is our opinion that typical asphalt pavement is suitable for the proposed development. We discuss these geotechnical considerations for the site below.

Existing Development and Fill

A portion of the existing development will be demolished as part of the site preparation work. GCI recommends that any building demolition work include removing existing slabs, walls, foundations, below-grade structures, pavements, and subsurface utilities (including trench backfill) to a minimum of 5 feet laterally outside the construction limits. GCI recommends all utilities be removed and rerouted from below the proposed building footprint areas. Abandoned utility lines (outside the zone of influence) should be capped to prevent loss of soil. Properly backfill excavations resulting from structure and utility removal with structural fill (as described in the Site Preparation and Earthwork section of the report) to proposed grade.

Our preliminary opinion is that the existing fill is not considered suitable for support of foundations. However, the existing fill is considered suitable for support of slabs provided it is firm and stable under a thorough proofroll. The owner will need to assume a slight risk of settlement if the fill is left in place. If this risk is not acceptable, GCI recommends that the existing fill be removed and replaced with structural fill. In our opinion, non-organic portions of the removed fill can be reused as structural fill provided it is placed as described in the Fill Placement and Compaction
section of this report.

Site Preparation
Remove existing trees, grub large root balls and strip topsoil and vegetation from the development area plus 5 feet laterally. Topsoil is not suitable for use as structural fill and should be stockpiled for use in green space or hauled off-site.

Subgrade Preparation
After stripping and making appropriate cuts, the earthwork contractor should proof-roll the exposed subgrade using a fully-loaded, tandem-axle dump truck (or equivalent) to identify potential soft, yielding subgrade areas. Soft spots identified during the proof-roll should be undercut to firm, stable conditions or otherwise stabilized prior to placing additional fill, including slab or pavement base construction.

The exposed subgrade will consist of existing fill (if left in place), natural clay-based soils and limestone bedrock. Exposed natural clay-based soils will pump excessively and become unstable when high in moisture content. Stabilization of soft subgrades by diskling, aerating/drying, and re-compaction may be feasible during traditionally drier times of the year. During wet seasons, partial undercutting and replacing wet soils with structural fill, drying with soil additives such as lime, or use of geosynthetics may be needed to create a stable subgrade before placing controlled fills. The use of soil additives, such as lime and flyash, or installation of geosynthetics should be reviewed by our office prior to use in the field. We expect fewer problems with soft subgrades if work is performed during traditionally drier times of the year (late spring, summer, and early fall). Traditionally wetter seasons (i.e. late fall, winter, and early
spring) will contribute to more problems associated with soft, very moist subgrades.

**Fill Placement and Compaction**

Fill within construction areas should be placed in a controlled manner. Fill should be placed in maximum 8-inch thick loose lifts and compacted to at least 98% of the maximum Standard Proctor dry density. Moisture should be controlled within 3% of the optimum Standard Proctor moisture. Reduce lift thickness to 6 inches in confined areas where hand operated compaction equipment is used. The clay-based site soils will compact best using static-weight, sheepsfoot compactors and granular materials will compact best with vibratory smooth-drum rollers.

Compaction will be difficult to obtain if soft/unstable subgrades are not properly remediated before starting to place fill, or if the proposed fill materials contain excess moisture. We recommend that site earthwork and grading be performed during traditionally drier times of the year such as late spring, summer, and early fall to reduce problems associated with very moist soils. It will be difficult to obtain proper compaction during wet seasons due to excess moisture.

**FOUNDATIONS**

We recommend that all foundations extend to intact limestone to avoid excess differential movement due to varying bearing conditions. Foundations bearing on intact limestone can be proportioned for an allowable bearing capacity not to exceed 10,000 pounds per square foot. Foundations should be sufficient size to accommodate foundation walls. It is anticipated that settlement will be less than ¼ inch for foundations bearing on intact limestone.
Dublin local frost code depth is 36 inches. In our opinion, footings bearing on intact limestone can bear above frost code depth (minimum 24" depth recommended).

FLOOR SLABS

In our opinion, existing fill (provided it is firm and stable), stable natural soils, bedrock, or new structural fill (bearing directly on firm and stable natural soil or bedrock) should be suitable for support of slab-on-grade construction, provided a thorough proofroll and stabilization program is performed. A subgrade modulus of 120 pci can be used for slab design (can be increased to 300 pci where slab subgrade is limestone). A minimum of 4 inches of underslab gravel is recommended beneath slab-on-grade floors to provide uniform support for the slab and a capillary cut-off for moisture. The aggregate thickness should be increased to at least 6 inches (and include drains) for below-grade slabs. We recommend placing a vapor barrier directly below the slab in areas where moisture may be a problem with slab-on-grade floor coverings.

EXCAVATIONS AND GROUNDWATER

The existing fill and natural soil above limestone can be excavated with conventional track hoe equipment. We encountered limestone bedrock at depths of 0.4 to 5 feet below existing grades, with auger refusal recorded on intact limestone at 4 to 6 feet below grades. Generally, if we cannot auger through the material, a backhoe will have limited success in excavation. Excavations into the limestone will require specialized rock techniques such as blasting, jack hammers, pneumatic hoe-rams, or ripper bars. All excavations should comply with current OSHA regulations.
We did not encounter groundwater seepage in the borings. If encountered, groundwater seepage should be controllable using portable pumps and working mats of crushed stone to allow for construction and backfilling under “dry” conditions. Contact GCI if substantial water flows are encountered.

**BELOW GRADE WALLS**

Walls restrained at both the top and bottom (conventional basement walls) should be designed to resist an at-rest lateral soil pressure. The design loading depends on the type of backfill material used and boundary support conditions. The recommended equivalent fluid pressures for differing types of soils/bedrock are as follows:

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Equivalent At-Rest Fluid Pressure (PCF)</th>
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</thead>
<tbody>
<tr>
<td>Lean Clay</td>
<td>75 pcf</td>
</tr>
<tr>
<td>Sand and Gravel (compacted)</td>
<td>55 pcf</td>
</tr>
<tr>
<td>Intact Rock (Limestone)</td>
<td>40 pcf</td>
</tr>
<tr>
<td>Assume overdig and backfill with crushed rock (#57’s)</td>
<td></td>
</tr>
</tbody>
</table>

We recommend that granular material (less than 15% passing the No. 200 sieve) be used for all wall backfill. This fill should be placed in a wedge shaped area extending from the base of the wall upward at an angle of 35 degrees from the vertical to utilize the lower lateral pressure. Cohesive soils are not recommended as wall backfill due to their poor drainage characteristics and potential for lateral wall loads resulting from surface frost. We recommend that exterior footing drains and underslab drains leading to a permanent
sump be installed to minimize the build up of hydrostatic forces behind the wall.

SEISMIC FACTOR

The borings at the site revealed a profile consisting of cohesive and granular fill, and natural clay-based soils, overlying limestone bedrock. In accordance with the Ohio Basic Building Code, we estimate the site to have a Site Class B – “rock”.

SITE PREPARATION AND EARTHWORK

1. Remove existing construction, per design, from the construction area plus 10 feet laterally. Abandoned utilities left in place outside these limits should be properly sealed to prevent soil loss.

2. Strip topsoil, vegetation, and organic matter from below the proposed pavement expansion area, and perform site cuts, plus to a minimum of 5 feet outside these limits. If the option to remove and replace existing fill is selected, remove fill to a minimum of 10 feet outside these limits. Non-organic excavated fill can be reused for structural fill. Topsoil can be stockpiled for redistribution in green space areas, disposal in on-site borrow pits, or wasted to landscaping beauty mounds.

3. Proof-roll the exposed subgrades with a fully-loaded, tandem-axle dump truck (or equivalent) to identify potential soft subgrade areas. Undercut soft areas or otherwise stabilize soft spots identified during the proof-roll prior to placing controlled fill to design grade.

4. Place controlled fills to design grade, as required. Non-organic natural soils are suitable for reuse in controlled fills. Off-site borrow materials should be reviewed by our office prior to use.

5. Place controlled fills in maximum 8-inch thick loose lifts and compact each lift to a minimum of 98% of the maximum Standard Proctor dry density (ASTM D-698). The moisture in the fill soils should be controlled to within ±3% of the optimum Standard Proctor moisture content. Depending on the time of year of earthwork, moisture adjustment of the site soils may be required to achieve proper compaction. Cohesive soils will compact best with a static sheepsfoot roller. Granular materials will compact best with vibratory smooth wheel roller.

6. Precautions should be taken when performing earthwork operations during winter weather or when freezing temperatures may occur. Contact GCI for additional recommendations on cold-weather earthwork operations, if applicable.
CONSTRUCTION MATERIALS ENGINEERING AND TESTING

GCI provides construction materials engineering and testing services. For project continuity throughout construction, we recommend that GCI be retained to observe, test, and document:

- earthwork procedures (stripping, fill placement, compaction, utility trench backfill, etc.),
- slab preparation (proof-rolling, excavations, undercuts, etc.),
- concrete placement and compressive strength testing (footings, slabs, pavements, etc.), and
- structural steel (welds, bolts, etc.).

The purpose of this work is to assess that the intent of our recommendations is being followed and to make timely changes to our recommendations (as needed) in the event site conditions vary from those encountered in our borings. Please contact our field department to initiate these services.

FINAL

We recommend that GCI review final site layout and grading plans.

Recommendations contained in this report may be changed based on review of final site plans. If any changes in the nature, design or locations of the construction are planned, conclusions and recommendations should not be considered valid unless verified in writing by GCI. The recommendations contained in this report are the opinion of GCI based on the subsurface conditions found in the borings and available development information.

This report has been issued to the client for design purposes. It should be noted that the nature and extent of variations between borings might not become evident until
construction. If variations then appear evident, it will be necessary to re-evaluate the recommendations of this report. This report has been prepared for design purposes only and should not be considered sufficient to prepare an accurate bid document. If you have any questions or need for any additional information, please contact our office. It has been a pleasure to be of service to you on this project, and we hope to continue our services through construction.
APPENDIX – Columbus Metro Library Dublin Branch Expansion

General Notes for Soil Sampling and Classifications
General Site Location Map (DeLorme Street Atlas USA 2014)
Boring Location Plan
Cross Section Profile
Summary of Encountered Subsurface Conditions
Test Boring Logs (B-1 to B-5)
BORINGS, SAMPLING AND GROUNDWATER OBSERVATIONS:
Drilling and sampling were conducted in accordance with procedures generally recognized and accepted as standard methods of exploration of subsurface conditions. The borings were drilled using a truck-mounted drill rig using auger boring methods with standard penetration testing performed in each boring at intervals ranging from 1.5 to 5.0 feet. The stratification lines on the logs represent the approximate boundary between soil types at that specific location and the transition may be gradual.

Water levels were measured at drill locations under conditions stated on the logs. This data has been reviewed and interpretations made in the text of the report. Fluctuations in the level of the groundwater may occur due to other factors than those present at the time the measurements were made.

The Standard Penetration Test (ASTM-D-1586) is performed by driving a 2.0 inch O.D. split barrel sampler a distance of 18 inches utilizing a 140 pound hammer free falling 30 inches. The number of blows required to drive the sampler each 6 inches of penetration are recorded. The summation of the blows required to drive the sampler for the final 12 inches of penetration is termed the Standard Penetration Resistance (N). Soil density/consistency in terms of the N-value is as follows:

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<th>COHESIONLESS DENSITY</th>
<th>COHESIVE CONSISTENCY</th>
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<tbody>
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<td>0-10</td>
<td>0-4</td>
</tr>
<tr>
<td>10-30</td>
<td>4-8</td>
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<tr>
<td>30-50</td>
<td>8-15</td>
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<tr>
<td>50 +</td>
<td>15-30</td>
</tr>
<tr>
<td></td>
<td>30 +</td>
</tr>
</tbody>
</table>

SOIL MOISTURE TERMS
Soil Samples obtained during the drilling process are visually characterized for moisture content as follows:

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<th>MOISTURE CONTENT</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Damp</td>
<td>Soil moisture is much drier than the Atterberg plastic limit (where soils are cohesive) and generally more than 3% below Standard Proctor “optimum” moisture conditions. Soils of this moisture generally require added moisture to achieve proper compaction.</td>
</tr>
<tr>
<td>Moist</td>
<td>Soil moisture is near the Atterberg plastic limit (cohesive soils) and generally within ±3% of the Standard Proctor “optimum” moisture content. Little to no moisture conditioning is anticipated to be required to achieve proper compaction and stable subgrades.</td>
</tr>
<tr>
<td>Very Moist</td>
<td>Soil moisture conditions are above the Atterberg plastic limit (cohesive soils) and generally greater than 3% above Standard Proctor “optimum” moisture conditions. Drying of the soils to near “optimum” conditions is anticipated to achieve proper compaction and stable subgrades.</td>
</tr>
<tr>
<td>Wet</td>
<td>Soils are saturated. Significant drying of soils is anticipated to achieve proper compaction and stable subgrades.</td>
</tr>
</tbody>
</table>

SOIL CLASSIFICATION PROCEDURE:
Soil samples obtained during the drilling process are preserved in plastic bags and visually classified in the laboratory. Select soil samples may be subjected to laboratory testing to determine natural moisture content, gradation, Atterberg limits and unit weight. Soil classifications on logs may be adjusted based on results of laboratory testing.

Soils are classified in accordance with the ASTM version of the Unified Soil Classification System. ASTM D-2487 “Classification of Soils for Engineering Purposes (Unified Soil Classification System) describes a system for classifying soils based on laboratory testing. ASTM D-2488 “Description and Identification of Soil (Visual-Manual Procedure) describes a system for classifying soils based on visual examination and manual tests.

Soil classifications are based on the following tables (see reverse side):
GENERAL NOTES FOR SOIL SAMPLING AND CLASSIFICATIONS

<table>
<thead>
<tr>
<th>PARTICLE SIZE DEFINITION</th>
<th>CONSTITUENT MODIFIERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boulders: &gt;12&quot;</td>
<td>Trace</td>
</tr>
<tr>
<td>Cobbles: 3&quot; to 12&quot;</td>
<td>Less than 5%</td>
</tr>
<tr>
<td>Gravel: Coarse: 3/4&quot; to 3&quot;</td>
<td>Few</td>
</tr>
<tr>
<td>Fine: No. 4 (3/16&quot;) to 3/4&quot;</td>
<td>Little 15-25%</td>
</tr>
<tr>
<td>Sand: Coarse: No. 10 (2.0mm) to No. 4 (4.75mm)</td>
<td>Some 30-45%</td>
</tr>
<tr>
<td>Medium: No. 40 (0.425mm) to No. 10 (2.0mm)</td>
<td>Mostly 50-100%</td>
</tr>
<tr>
<td>Fine: No. 200 (0.074mm) to No. 40 (0.425mm)</td>
<td>Silt &amp; Clay &lt;0.074mm; classification based on overall plasticity; in general clay particles &lt;0.005mm.</td>
</tr>
</tbody>
</table>

ASTM/UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

<table>
<thead>
<tr>
<th>COARSE-GRAINED SOILS (more than 50% of materials is larger than No. 200 sieve size)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRAVELS</td>
</tr>
<tr>
<td>More than 50% of coarse fraction larger than No. 4 sieve size</td>
</tr>
<tr>
<td>GW Well-graded gravel, gravel-sand mixtures, little or no fines</td>
</tr>
<tr>
<td>GP Poorly-graded gravels, gravel-sand mixtures, little or no fines</td>
</tr>
<tr>
<td>GM Silty gravels, gravel-sand-silt mixtures</td>
</tr>
<tr>
<td>GC Clayey gravels, gravel-sand-clay mixtures</td>
</tr>
<tr>
<td>Sands</td>
</tr>
<tr>
<td>More than 50% of coarse fraction smaller than No. 4 sieve size</td>
</tr>
<tr>
<td>SW Well-graded sands, gravelly sands, little or no fines</td>
</tr>
<tr>
<td>SP Poorly-graded sands, gravelly sands, little or no fines</td>
</tr>
<tr>
<td>SM Silty sands, sand-silt mixtures</td>
</tr>
<tr>
<td>SC Clayey sands, sand-clay mixtures</td>
</tr>
</tbody>
</table>

Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows:

- Less than 5 percent: GW, GP, SW, SP
- Greater than 12 percent: GM, GC, SM, SC
- 5 to 12 percent: Borderline cases requiring dual symbols: SP-SM, GP-GM, etc.

FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size)

<table>
<thead>
<tr>
<th>SILTS AND CLAYS Liquid Limit less than 50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity</td>
</tr>
<tr>
<td>CL Inorganic clays or low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays</td>
</tr>
<tr>
<td>CL-ML Inorganic silty clay of slight plasticity, P.I. between 4 and 7</td>
</tr>
<tr>
<td>OL Organic silts and organic silty clays of low plasticity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SILTS AND CLAYS Liquid Limit 50% or greater</th>
</tr>
</thead>
<tbody>
<tr>
<td>MH Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts</td>
</tr>
<tr>
<td>CH Inorganic clays of high plasticity, fine clays</td>
</tr>
<tr>
<td>OH Organic clays or medium to high plasticity, organic silts</td>
</tr>
</tbody>
</table>

HIGHLY ORGANIC SOILS

| PT Peat and other highly organic soils                                           |
Summary of Encountered Subsurface Conditions

Columbus Metropolitan Library Dublin Branch Expansion
West North Street - Dublin, Ohio
GCI Job Number: 16-G-20433

<table>
<thead>
<tr>
<th>Borehole</th>
<th>Surface Elevation (feet) *</th>
<th>Surface Layer</th>
<th>Topsoil Thickness (ft.)</th>
<th>Pavement Thickness (inches)</th>
<th>Bottom of Fill Cover (feet)</th>
<th>Groundwater: Level Encountered (ft) Depth</th>
<th>Elevation*</th>
<th>Depth to Top of Lean Clay (ft)</th>
<th>Depth to Top of Bedrock (ft)</th>
<th>Bottom of Boring Depth (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-1</td>
<td>832.0</td>
<td>Asphalt</td>
<td>--</td>
<td>6 9</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.3</td>
<td>1.7</td>
<td>2.7</td>
</tr>
<tr>
<td>B-2</td>
<td>831.5</td>
<td>Asphalt</td>
<td>--</td>
<td>4 3</td>
<td>2.0</td>
<td>--</td>
<td>--</td>
<td>2.0</td>
<td>4.5</td>
<td>4.8</td>
</tr>
<tr>
<td>B-3</td>
<td>831.5</td>
<td>Fill</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>3.0</td>
<td>--</td>
<td>3.0</td>
<td>5.0</td>
<td>5.8</td>
</tr>
<tr>
<td>B-4</td>
<td>830.0</td>
<td>Topsoil</td>
<td>0.4</td>
<td>--</td>
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<td>--</td>
<td>--</td>
<td>--</td>
<td>0.4</td>
<td>0.6</td>
</tr>
<tr>
<td>B-5</td>
<td>832.5</td>
<td>Fill</td>
<td>--</td>
<td>--</td>
<td>1.5</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>1.5</td>
<td>4.1</td>
</tr>
</tbody>
</table>

Average Topsoil Depth at boring locations: 0.4 feet

Boring Location Asphalt Depths
Avg: 5.0 inches
Max: 6.0 inches
Min: 4.0 inches

Boring Location Stone Base Depths
Avg: 6.0 inches
Max: 9.0 inches
Min: 3.0 inches
**TEST BORING LOG**

**PROJECT NAME**  Columbus Metropolitan Library Dublin Branch Expansion - West North Street - Dublin, Ohio  
**CLIENT**  Columbus Metropolitan Library  

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>Pocket Penetrometer (ft)</th>
<th>Sample Depths From</th>
<th>Type of Sample</th>
<th>Blows per 6&quot; on Sampler From 0-6</th>
<th>Blows per 6&quot; on Sampler From 6-12</th>
<th>Blows per 6&quot; on Sampler From 12-18</th>
<th>Moisture Density or Consist.</th>
<th>Strata Change Depth*</th>
<th>SOIL IDENTIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
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<td></td>
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<td></td>
<td>Asphalt (6&quot;) over Stone (9&quot;)</td>
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<tr>
<td>1.3</td>
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<td></td>
<td></td>
<td></td>
<td>Brown Lean Clay</td>
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<tr>
<td>1.7</td>
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<td></td>
<td>LIMESTONE: gray, slightly weathered to intact, high hardness</td>
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<td>2.7</td>
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</tbody>
</table>

**GROUND WATER OBSERVATION**

None FEET BELOW SURFACE AT COMPLETION

____ FEET BELOW SURFACE AT 24 HOURS

____ FEET BELOW SURFACE AT ____ HOURS

**Proportions Used**

<table>
<thead>
<tr>
<th>Trace</th>
<th>Less than 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Few</td>
<td>5 to 10%</td>
</tr>
<tr>
<td>Little</td>
<td>15 to 25%</td>
</tr>
<tr>
<td>Some</td>
<td>30 to 45%</td>
</tr>
<tr>
<td>Mostly</td>
<td>50 to 100%</td>
</tr>
</tbody>
</table>

**140 lb Wt. x 30" fall on 2" O.D. Sampler**

<table>
<thead>
<tr>
<th>Cohesionless Density</th>
<th>Cohesive Consistency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loose</td>
<td>Soft</td>
</tr>
<tr>
<td>Medium Dense</td>
<td>Medium Stiff</td>
</tr>
<tr>
<td>Dense</td>
<td>Stiff</td>
</tr>
<tr>
<td>Very Dense</td>
<td>Very Stiff</td>
</tr>
</tbody>
</table>

**LOCATION OF BORING**

See Boring Location Plan

*The stratification lines represent the approximate boundary between soil types and the transition may be gradual.*

720 Greencrest Drive  •  Westerville, Ohio 43081  •  614-895-1400
# TEST BORING LOG

**PROJECT NAME**: Columbus Metropolitan Library Dublin Branch Expansion - West North Street - Dublin, Ohio

**CLIENT**: Columbus Metropolitan Library

**BORING NO.**: B-2

**SURF. ELEV.**: 831.5 ±

**NO.**: 16-G-20433

**DATE DRILLED**: 1/6/2017

## GROUND WATER OBSERVATION

<table>
<thead>
<tr>
<th>None</th>
<th>FEET BELOW SURFACE AT COMPLETION</th>
</tr>
</thead>
<tbody>
<tr>
<td>_____</td>
<td>FEET BELOW SURFACE AT 24 HOURS</td>
</tr>
<tr>
<td>_____</td>
<td>FEET BELOW SURFACE AT _____ HOURS</td>
</tr>
</tbody>
</table>

## LOCATION OF BORING

**Pocket Penetration (ft)** | **Sample Depths** | **Type of Sample** | **Blows per 6" on Sampler from 0-6** | **Moisture Density or Consist.** | **Strata Change Depth** | **SOIL IDENTIFICATION** | **Remarks include color, type of soil, etc.** | **Rock-color, type, condition, hardness** |
<table>
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</tbody>
</table>

* The stratification lines represent the approximate boundary between soil types and the transition may be gradual.
**GROUND WATER OBSERVATION**

None FEET BELOW SURFACE AT COMPLETION

--- FEET BELOW SURFACE AT 24 HOURS

--- FEET BELOW SURFACE AT --- HOURS

**LOCATION OF BORING**

<table>
<thead>
<tr>
<th>Depth Pocket</th>
<th>Sample Depths From</th>
<th>Sample Type</th>
<th>Blows per 6&quot; on Sampler From 0-6, 6-12, 12-18</th>
<th>Moisture Density or Consist.</th>
<th>Strata Change Depth*</th>
</tr>
</thead>
<tbody>
<tr>
<td>---</td>
<td>0.0-1.5</td>
<td>SS</td>
<td>3, 3, 6</td>
<td>Moist</td>
<td>0.1</td>
</tr>
<tr>
<td>---</td>
<td>2.0-3.5</td>
<td>SS</td>
<td>4, 4, 5</td>
<td>Moist</td>
<td>3.0</td>
</tr>
<tr>
<td>2.0</td>
<td>4.0-5.5</td>
<td>SS</td>
<td>3, 3, 7</td>
<td>Moist</td>
<td>5.0</td>
</tr>
</tbody>
</table>

**SOIL IDENTIFICATION**

FILL: Topsoil

FILL: Gray Silty Sand, Gravel, Stone

Brown Lean Clay (CL) contains 5-10% sand, moderate plasticity

LIMESTONE: gray, slightly weathered to intact, high hardness

AUGER REFUSAL AND BOTTOM OF BORING: 5.8'

* The stratification lines represent the approximate boundary between soil types and the transition may be gradual.
## TEST BORING LOG

**PROJECT NAME:** Columbus Metropolitan Library Dublin Branch Expansion - West North Street - Dublin, Ohio  
**CLIENT:** Columbus Metropolitan Library  
**BORING NO.:** B-4  
**PROJ. NO.:** 16-G-20433  
**DATE DRILLED:** 1/6/2017

### GROUND WATER OBSERVATION

<table>
<thead>
<tr>
<th>None</th>
<th>FEET BELOW SURFACE AT COMPLETION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>FEET BELOW SURFACE AT 24 HOURS</td>
</tr>
<tr>
<td></td>
<td>FEET BELOW SURFACE AT ____ HOURS</td>
</tr>
</tbody>
</table>

### LOCATION OF BORING

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>Pocket Penetrometer (tfl)</th>
<th>Sample Depths From To</th>
<th>Type of Sample</th>
<th>Blows per 6&quot; on Sampler From To</th>
<th>Moisture Density or Consist.</th>
<th>Strata Change Depth*</th>
<th>SOIL IDENTIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Topsoil</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>Limestone</td>
</tr>
</tbody>
</table>

AUGER REFUSAL AND BOTTOM OF BORING: 0.6'

NOTE: Hand auger at several locations near location B-4

* The stratification lines represent the approximate boundary between soil types and the transition may be gradual.
## TEST BORING LOG

**PROJECT NAME** Columbus Metropolitan Library Dublin Branch Expansion - West North Street - Dublin, Ohio

**CLIENT** Columbus Metropolitan Library

**BORE NO.** B-5

**SURF. ELEV.** 832.5

**NO.** 16-G-20433

**DATE DRILLED** 1/6/2017

### GROUND WATER OBSERVATION

| None | FEET BELOW SURFACE AT COMPLETION
|------|-------------------------------|
| ____ | FEET BELOW SURFACE AT 24 HOURS
| ____ | FEET BELOW SURFACE AT ____ HOURS

### LOCATION OF BORING

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>Pocket Penetrometer (tsf)</th>
<th>Sample Depths From To</th>
<th>Type of Sample</th>
<th>Blows per 6&quot; on Sampler From 0-6 6-12 12-18</th>
<th>Moisture Density or Consist.</th>
<th>Strata Change Depth*</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.5</td>
<td>0.0-1.5 SS</td>
<td>2 3 3</td>
<td>Moist</td>
<td>1.5 FILL: Topsoil, Brown Lean Clay, Gravel, Limestone Fragments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5</td>
<td>2.0-3.5 SS</td>
<td>17 26 18</td>
<td>Moist</td>
<td>4.1 LIMESTONE: gray, moderately weathered to intact, high hardness</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NR</td>
<td>4.0 SS 50/0</td>
<td>4.1</td>
<td></td>
<td>AUGER REFUSAL AND BOTTOM OF BORING: 4.1'</td>
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### Proportions Used

<table>
<thead>
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<th>Trace</th>
<th>Less than 5%</th>
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<tbody>
<tr>
<td>Few</td>
<td>5 to 10%</td>
</tr>
<tr>
<td>Little</td>
<td>15 to 25%</td>
</tr>
<tr>
<td>Some</td>
<td>30 to 45%</td>
</tr>
<tr>
<td>Mostly</td>
<td>50 to 100%</td>
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</table>

### 140 lb Wt. x 30" fall on 2" O.D. Sampler

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<tr>
<th>Cohesionless Density</th>
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<tbody>
<tr>
<td>Trace</td>
</tr>
<tr>
<td>Few</td>
</tr>
<tr>
<td>Little</td>
</tr>
<tr>
<td>Some</td>
</tr>
<tr>
<td>Mostly</td>
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</table>

<table>
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<th>Cohesive Consistency</th>
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<tr>
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<tr>
<td>Very Dense</td>
</tr>
<tr>
<td>Hard</td>
</tr>
</tbody>
</table>

*The stratification lines represent the approximate boundary between soil types and the transition may be gradual.*

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PART 1 - GENERAL

1.1 SUMMARY

A. |Section includes:
1. Project information.
2. Work covered by Contract Documents.
3. Work by Owner.
4. Owner-furnished products.
5. Access to site.
6. Work restrictions.
7. Specification and drawing conventions.

1.2 PROJECT INFORMATION

A. Project Identification:
1. Name: Northside Branch Library.
2. Project number: 101398.01.

B. Owner: Columbus Metropolitan Library.
1. Owner's Representative: Wendy Tressler.
2. Owner's Commissioning Agent: Go Sustainable Energy.

C. Architect: NBBJ.

D. Construction Manager: Turner Construction Company.
1. Construction Manager for this Project is Project's constructor. In Divisions 01 through 49 Sections, the terms "Construction Manager" and "Contractor" are synonymous.

E. Project Web Site: A Project Web site administered by the Construction Manager will be used for purposes of managing communication and documents during the construction stage.
1. See Section 013100 - Project Management and Coordination for Construction Manager's requirements for establishing, and utilizing the Project Web site.

1.3 ISSUE SYSTEM

A. Document Issues: The design and documentation by Construction Documents for this Project is an ongoing process by the Architect and his consultants. At various times during the course of document preparation, certain portions of these documents may be released for construction (or other purposes) of portions of the Work desired by the Construction Manager.
1. Document Issues prepared by the Architect do not necessarily define the complete and detailed "scope" of work by trades or contracts. Such work scope allocations shall be defined only by the Construction Manager.
2. Content of a Document Issue are based on normal sequence requirements of design and construction plus long lead items determined by Construction Manager.

3. Document Issues are intended to cover general areas of construction and may contain more or less information required for specific subcontracts. As subsequent Document Issues are released, information from previous packages may remain in a duplicated form. Scope definition for individual packages is solely the Construction Manager’s responsibility. The full scope of the Project will be contained in the various packages upon completion of all documents as determined by the Architect.

4. These partial issues will carry a number (or letter) for each document (i.e. specification section and drawing) beginning with "Issue 1" for the original issue of each document. Subsequent additions and modifications to the documents will carry a new number (usually the next sequential number).

5. Document Revisions/Modifications: When required, affected documents will be re-released. Modifications to Lettered Issues may be highlighted. Modifications to Numbered Issues will be highlighted as follows:
   a. Specifications:
      1) New Issue number will be shown in the Section header and current Issue number shown in Document 000110, Table of Contents.
      2) Changes will be highlighted such as with bold or strikethrough font.
   b. Drawings:
      1) New Issue number will be shown in the Sheet Title block under Revision and in the Sheet Index.
      2) Changed Drawing areas will be highlighted such as with clouds or tone and keyed to Issue number.

6. Numbered Issues will be additive so that the combined last issues will represent the requirements for the Project.

7. Issue Designations:
   a. Numbered issues (e.g. Issue 1) are intended for construction.
   b. Lettered issues (e.g. Issue R1 and A) are for information, pricing, review, reference, or other uses except construction or basis of contracts.

8. The Issue system will replace addenda and bulletins as mechanisms to modify the Bidding and Contract Documents until Document Completion is achieved for the Project as determined by the Architect.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of the Project is defined by the Contract Documents and consists of the following:
   1. Three story public library building and site work.
   2. Project will be constructed under a single prime contract. A Construction Manager "at risk" contract based on a Guaranteed Maximum Price. Construct work under contracts as arranged by the Construction Manager.

1.5 WORK BY OWNER

A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
1.6 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

B. Concurrent Work: Owner may award separate contract(s) for the following construction operations at Project site. Those operations will be conducted simultaneously with work under this Contract.

1.7 OWNER-FURNISHED PRODUCTS

A. Owner will furnish products indicated. The Work includes receiving, unloading, handling, storing, protecting, and installing Owner-furnished products.

B. Owner-Furnished Products:
   1. Bookshelves.

1.8 ACCESS TO SITE

A. General: Construction Manager shall have full use of Project site for construction operations during construction period. Construction Manager's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

B. Use of Site: Limit use of Project site to areas within the Contract limits indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1.9 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.
   1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 6:00 p.m., Monday through Friday.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
   1. Notify Owner not less than two days in advance of proposed utility interruptions.
   2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
   1. Notify Owner not less than two days in advance of proposed disruptive operations.
   2. Obtain Owner's written permission before proceeding with disruptive operations.
E. Nonsmoking Building: Smoking is not permitted within the building or within 25 feet (8 m) of entrances, operable windows, or outdoor air intakes.

F. Controlled Substances: Use of tobacco products and other controlled substances on the Project site is not permitted.

G. Employee Identification: Construction Manager identification tags for Contractor personnel working on the Project site. Require personnel to utilize identification tags at all times.

H. Employee Screening: Comply with Owner's requirements regarding drug and background screening of Contractor personnel working on the Project site.
   1. Maintain list of approved screened personnel with Owner's Representative.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
   1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
   2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:
   1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
   2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.

D. The Specifications for the work are arranged in various Sections relating to products, systems, or both as a convenience to the Construction Manager to more clearly show the extent of work involved. These Sections are not intended to define any complete Subcontract. Construction Manager shall verify proposals and shall furnish all labor, materials, appliances and services necessary to provide a complete installation as indicated in the Contract Documents. The Architect's position is that all work is performed by the Construction Manager and questions concerning work included under Trade Contractors are entirely between the Construction Manager and his Trade Contractors.

E. Project Manual Document and Section Number Format: Six digit Section numbers formatted two spaces (such as "00 00 00") and with one space (such as "00 00 00") are as though they were formatted without spaces (such as "000000") and conversely.
PART 3 - EXECUTION

3.1 WEATHERTIGHT CONSTRUCTION

A. The Project shall be weathertight for enclosed spaces. Under design conditions, the building enclosure including, but not limited to, roofs, clerestories, skylights, exterior wall systems, and fenestration shall not leak water to building interior nor shall there be uncontrolled water within the building enclosure construction. Where the construction documents do not provide guidance or where guidance appears to conflict with recognized industry practice, advise Architect and request clarification of detail(s) in question. Provide at least standard good practice procedures needed for weathertight construction.

B. Waterproofing: Work to receive waterproofing shall be watertight.

C. Non-enclosed spaces with weather barriers should be leakproof to the extent of their intended function.
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.2 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.

2. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.3 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.
PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. G-1 - Carpet.
   1. Areas Affected: Floors schedule to receive CPPT-1.
   2. Base Bid: Provide carpet as specified in Section 096816 - Sheet Carpeting.
   3. Alternate: Provide carpet as specified in Section 096813 - Tile Carpeting.

   1. Areas Affected: Masonry veneer at exterior wall construction.
   2. Base Bid:
      a. Provide Clay Brick Veneer in Conformance with Section 042613 - Veneer Masonry and Section 042613 - Site Masonry Walls.
      b. Delete Articles titled "Cast Stone Brick Veneer" and "Anchored Stone Masonry Veneer" from Section 042613 - Veneer Masonry and Section 042613 - Site Masonry Walls.
      c. Provide Clay Brick Veneer in Conformance with Section 042613 at Site and Section 042713.
   3. Alternate:
      b. Delete Article titled "Clay Brick Veneer" from Section 042613 - Veneer Masonry.
      c. Delete Article titled "Clay Brick Veneer" from Section 042613 - Site Masonry Walls.

C. Alternate No. G-3 - Elevator Maintenance Period:
   a. Base Bid:
      1) Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include twelve months full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
         a) Perform maintenance during normal working hours.
         b) Perform emergency callback service during normal working hours with response time of two hours or less.
         c) Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of two hours or less.
b. Alternate No. G-3A:
   1) Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include twenty-four months full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
      a) Perform maintenance during normal working hours.
      b) Perform emergency callback service during normal working hours with response time of two hours or less.
      c) Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of two hours or less.

c. Alternate No. G-3B:
   1) Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include sixty months full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
      a) Perform maintenance during normal working hours.
      b) Perform emergency callback service during normal working hours with response time of two hours or less.
      c) Include 24-hour-per-day, 7-day-per-week emergency callback service with response time of two hours or less.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Sections:
   1. 016000 - Product Requirements: For requirements for submitting comparable product submittals for products by listed manufacturers.
   2. Divisions 02 through 49 Sections for specific requirements and limitations for substitutions.

1.2 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
   1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
   2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Owner.

1.3 SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
      a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
      b. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

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

e. Samples, where applicable or requested.

f. Certificates and qualification data, where applicable or requested.

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

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

i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.

j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

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

l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.

m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.


b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.
1.5 PROCEDURES

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
   a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
   b. Substitution request is fully documented and properly submitted.
   c. Requested substitution will not adversely affect Contractor's construction schedule.
   d. Requested substitution has received necessary approvals of authorities having jurisdiction.
   e. Requested substitution is compatible with other portions of the Work.
   f. Requested substitution has been coordinated with other portions of the Work.
   g. Requested substitution provides specified warranty.
   h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Not allowed.

PART 3 - EXECUTION (Not Used)

END OF SECTION
SECTION 012501 - SUBSTITUTION REQUEST FORM

Substitution Request Number: ______________

TO:  NBBJ, 250 South High Street, Suite 300 Columbus Ohio 43215 .  
     Attn:  Tracy Perry.  

FROM:  <Insert Contractor name>

Specification Section: <00 0000 - Section Title>  

Article and Paragraph(s): ______________

Specified Item: ______________

Proposed Substitution: ______________

Select one of the following:

PART 1 - SUBSTITUTION FOR CAUSE: Required due to change in project conditions as follows:

□ PART 2 - Unavailability of Product: ______________
□ PART 3 -
□ PART 4 - Unsuitability: ______________
□ PART 5 -
□ PART 6 - Regulatory Change: ______________
□ PART 7 -
□ PART 8 - Unavailability of Required Warranty: ______________
□ PART 9 -

□ SUBSTITUTION FOR CONVENIENCE: Requested substitution offers the following substantial advantage(s) to Owner:

□ PART 10 - Cost (Dollar Amount): ______________
□ PART 11 - Time (Days): ______________
□ PART 12 - Energy Conservation (Dollar Amount): ______________
□ PART 13 - Other (Explain): ______________
□ PART 14 -

The Undersigned certifies that:

PART 15 - Proposed substitution meets requirements stipulated in Section 012500 - Substitution Procedures.  
PART 16 - Required documentation for proposed substitution is provided in accordance with Section 012500 - Substitution Procedures.  
PART 17 - Proposed substitution has been fully investigated and determined to be equal or superior to specified item.  
PART 18 - Same warranty will be furnished for proposed substitution as for specified item.  
PART 19 - Proposed substitution will have no adverse effect on other Work and will not affect or delay progress schedule.

NBBJ Project No. 101398.01
PART 20 - Cost data stated is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are waived.
PART 21 - Proposed substitution does not affect dimensions and functional clearances.

CERTIFICATION OF EQUAL PERFORMANCE AND ASSUMPTION OF LIABILITY FOR EQUAL PERFORMANCE

Submitted By (Contractor): ______________________________________________________
Signature __________________________________________________ Date _____________
Printed Name and Title _________________________________________________________

Signature must be by person having authority to legally bind his firm to the above terms. Failure to provide legally binding signature will result in retraction of approval

ARCHITECT’S REVIEW AND ACTION

____Substitution Approved
____Substitution Approved as Noted
____Substitution Rejected

Signature: __________________________________________________ Date _____________
Printed Name and Title _________________________________________________________

Additional Comments:
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

END OF SECTION
SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

B. Related Sections:
   1. 012500 - Substitution Procedures: For administrative procedures for handling requests for substitutions made after Contract award.

1.2 MINOR CHANGES IN THE WORK

A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on form included in the Project Manual.

1.3 PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
   1. Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
   2. Within time specified in Proposal Request or 20 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
      a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      c. Include costs of labor and supervision directly attributable to the change.
      d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
      e. Quotation Form: Use form acceptable to Architect.
B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
4. Include costs of labor and supervision directly attributable to the change.
5. Include an updated Contractor’s construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
6. Comply with requirements in Section 012500 - Substitution Procedures if the proposed change requires substitution of one product or system for product or system specified.

1.4 CHANGE ORDER PROCEDURES
A. On Owner's approval of a Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on form provided by Owner.

1.5 CONSTRUCTION CHANGE DIRECTIVE
1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.
PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION
SECTION 012900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.3 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.

b. Submittal schedule.

c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

3. Sub-schedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide sub-schedules showing values correlated with each element.

B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:

a. Project name and location.

b. Name of Architect.

c. Architect's project number.

d. Contractor's name and address.

e. Date of submittal.
2. Arrange schedule of values consistent with format of AIA Document G703. Provide separate labor and material breakdown, and breakdowns as required for LEED certification.

3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
      1) Labor.
      2) Materials.
      3) Equipment.

   a. Include separate line items under Contractor and principal subcontracts for project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.

5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
   a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.

7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

8. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.

9. Purchase Contracts: Provide a separate line item in the schedule of values for each purchase contract. Show line-item value of purchase contract. Indicate owner payments or deposits, if any, and balance to be paid by Contractor.

10. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
    a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
11. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

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

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
   1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.

C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Construction Manager will return incomplete applications without action.
   1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
   2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
   3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
   4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
   1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
   2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
   3. Provide summary documentation for stored materials indicating the following:
      a. Materials previously stored and included in previous Applications for Payment.
      b. Work completed for this Application utilizing previously stored materials.
      c. Additional materials stored with this Application.
      d. Total materials remaining stored, including materials with this Application.
F. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
   1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
   1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
   2. When an application shows completion of an item, submit conditional final or full waivers.
   3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
   4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
   1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
   2. When an application shows completion of an item, submit conditional final or full waivers.
   3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
   4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
   5. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.

I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
   1. List of subcontractors.
   2. Schedule of values.
   3. Contractor's construction schedule (preliminary if not final).
   4. Combined Contractor's construction schedule (preliminary if not final) incorporating Work of multiple contracts, with indication of acceptance of schedule by each Contractor.
   5. Products list (preliminary if not final).
   6. Schedule of unit prices.
   7. Submittal schedule (preliminary if not final).
   8. List of Contractor's staff assignments.
12. Initial progress report.
14. Certificates of insurance and insurance policies.
15. Performance and payment bonds.
16. Data needed to acquire Owner’s insurance.

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

K. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
   1. Evidence of completion of Project closeout requirements.
   2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
   3. Updated final statement, accounting for final changes to the Contract Sum.
   4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
   6. AIA Document G707, "Consent of Surety to Final Payment."
   7. Evidence that claims have been settled.
   8. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION
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SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on the Project including, but not limited to, the following:
   1. General project coordination procedures.
   2. Administrative and supervisory personnel.
   3. Coordination drawings.
   4. Requests for Information (RFIs).
   5. Project Web site.
   6. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Sections:
   1. 017300 - Execution: For procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
   2. 017700 - Closeout Procedures: For coordinating closeout of the Contract.
   3. 019113 - General Commissioning Requirements: For coordinating the Work with Owner's commissioning authority.

1.2 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
   1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
   2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
   3. Make adequate provisions to accommodate items scheduled for later installation.

B. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.

3. Make adequate provisions to accommodate items scheduled for later installation.

C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

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

1. Preparation of Contractor’s construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.
9. Project closeout activities.

1.3 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

1.4 KEY PERSONNEL

A. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, on Project Web site, and by each temporary telephone. Keep list current at all times.
1.5 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
   1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
   2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
   1. Project name.
   2. Project number.
   3. Date.
   4. Name of Contractor.
   5. Name of Architect.
   6. RFI number, numbered sequentially.
   7. RFI subject.
   8. Specification Section number and title and related paragraphs, as appropriate.
   9. Drawing number and detail references, as appropriate.
   10. Field dimensions and conditions, as appropriate.
   11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
   12. Contractor's signature.
   13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
      a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Form with content indicated above, acceptable to Architect.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.
   1. The following RFIs will be returned without action:
      a. RFIs that, in the opinion of the Architect, are frivolous or invalid.
      b. Requests for information already indicated in the Contract Documents.
      c. Requests for approval of submittals.
      d. Requests for approval of substitutions.
      e. Requests for coordination information already indicated in the Contract Documents.
      f. Requests for adjustments in the Contract Time or the Contract Sum.
      g. Requests for interpretation of Architect's actions on submittals.
      h. Incomplete RFIs or inaccurately prepared RFIs.
2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.

3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 012600 - Contract Modification Procedures.
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.

E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use software log that is part of Project Web site.
   1. Project name.
   2. Name and address of Contractor.
   3. Name and address of Architect.
   4. RFI number including RFIs that were returned without action or withdrawn.
   5. RFI description.
   6. Date the RFI was submitted.
   7. Date Architect's response was received.
   8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.6 PROJECT WEB SITE

A. Use Construction Manager's Project Web site for purposes of hosting and managing project communication and documentation until Final Completion. Project Web site shall include the following functions:
   1. Project directory.
   2. Project correspondence.
   3. Meeting minutes.
   5. RFI forms and logs.
   6. Task and issue management.
   7. Photo documentation.
   8. Schedule and calendar management.
   10. Payment application forms.
   11. Drawing and specification document hosting, viewing, and updating.
   13. Reminder and tracking functions.
B. Provide up to Ten Project Web site user licenses for use of the Owner, Architect, and Architect's consultants. Provide eight hours of software training at Architect's office for Project Web site users.

C. Upon completion of Project, provide one complete archive copy of Project Web site files to Owner and to Architect in a digital storage format acceptable to the Architect.

D. Contractor, subcontractors, and other parties granted access by the Construction Manager to project Web site shall execute a data licensing agreement in the form of an Agreement acceptable to the Construction Manager, Owner, and Architect.

1.7 PROJECT MEETINGS

A. General: Construction Manager will schedule and conduct meetings and conferences at Project site unless otherwise indicated.
   1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
   2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
   3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.

B. Preconstruction Conference: Construction Manager will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
   1. Attendees: Authorized representatives of Owner, Construction Manager, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
   2. Agenda: Discuss items of significance that could affect progress, including the following:
      a. Tentative construction schedule.
      b. Phasing.
      c. Critical work sequencing and long-lead items.
      d. Designation of key personnel and their duties.
      e. Procedures for processing field decisions and Change Orders.
      f. Procedures for RFI's.
      g. Procedures for testing and inspecting.
      h. Procedures for processing Applications for Payment.
      i. Distribution of the Contract Documents.
      j. Submittal procedures.
      k. Sustainable design requirements.
      l. Preparation of record documents.
      m. Work restrictions.
n. Working hours.
o. Owner’s occupancy requirements.
p. Responsibility for temporary facilities and controls.
q. Procedures for moisture and mold control.
r. Procedures for disruptions and shutdowns.
s. Construction waste management and recycling.
t. Parking availability.
u. Office, work, and storage areas.
v. Equipment deliveries and priorities.
w. First aid.
x. Security.
y. Progress cleaning.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
   b. Options.
   c. Related RFIs.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. Sustainable design requirements.
   i. Review of mockups.
   j. Possible conflicts.
   k. Compatibility problems.
   l. Time schedules.
   m. Weather limitations.
   n. Manufacturer’s written instructions.
   o. Warranty requirements.
   q. Acceptability of substrates.
   r. Temporary facilities and controls.
   s. Space and access limitations.
   t. Regulations of authorities having jurisdiction.
   u. Testing and inspecting requirements.
   v. Installation procedures.
   w. Coordination with other work.
   x. Required performance results.
y. Protection of adjacent work.
z. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Construction Manager will conduct progress meetings at weekly intervals.

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

2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
   a. Construction Manager's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Construction Manager's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      1) Review schedule for next period.
   b. Review present and future needs of each entity present, including the following:
      1) Interface requirements.
      2) Sequence of operations.
      3) Status of submittals.
      4) Status of sustainable design documentation.
      5) Deliveries.
      6) Off-site fabrication.
      7) Access.
      8) Site utilization.
      9) Temporary facilities and controls.
     10) Progress cleaning.
     11) Quality and work standards.
     12) Status of correction of deficient items.
     13) Field observations.
     14) Status of RFIs.
     15) Status of proposal requests.
     16) Pending changes.
     17) Status of Change Orders.
18) Pending claims and disputes.
19) Documentation of information for payment requests.

3. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
   a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION
SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

1.2 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect’s responsive action. Action submittals are those submittals indicated in individual Specification Sections and limited to the following:
   1. Product Data
   2. Shop Drawings
   3. Samples
   4. Product Schedules
   5. Submittal Schedule
   6. Applications for Payment
   7. Schedule of Values
   8. Subcontract List

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect’s responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as informational submittals and may include the following:
   1. Preconstruction Submittals.
   2. Schedules.
   3. Certificates and certifications.
   4. Special warranty forms.
   5. Sustainable design submittals.
   6. Test and inspection reports.
   7. Construction photographs.
   8. Meeting minutes.
   9. Coordination drawings.

C. File Transfer Protocol (FTP): Communications protocol that enables transfer of files to and from another computer over a network and that serves as the basis for standard Internet protocols. An FTP site is a portion of a network located outside of network firewalls within which internal and external users are able to access files.

1.3 ACTION SUBMITTALS

A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or modifications to submittals noted by the Architect and additional time for handling and reviewing submittals required by those corrections.
   1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
   2. Initial Submittal: Submit concurrently with start-up construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
   3. Final Submittal: Submit concurrently with the first complete submittal of Construction Manager's construction schedule.
      a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
   a. Scheduled date for first submittal.
   b. Specification Section number and title.
   c. Submittal category: Action, informational.
   d. Name of subcontractor.
   e. Description of the Work covered.
   f. Scheduled date for Architect's final release or approval.
   g. Scheduled dates for purchasing.
   h. Scheduled dates for installation.
   i. Activity or event number.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic copies of digital data files the Contract Drawings will be provided by Architect for Construction Manager's use in preparing submittals as specified in Section 006000 - CAD RELEASE.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
   3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
   4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
      a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Construction Manager when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

3. Resubmittal Review: Allow 15 days for review of each resubmittal.

4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 21 days for review of each submittal. Submittal will be returned to Construction Manager, through Architect, before being returned to Contractor.

D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:

1. Assemble complete submittal package into a single indexed file with links enabling navigation to each item.

2. Name file with submittal number or other unique identifier, including revision identifier.
   a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., CML-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., CML-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

4. Include the following information on an inserted cover sheet:
   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name of Construction Manager.
   e. Name of Contractor.
   f. Name of firm or entity that prepared submittal.
   g. Name of subcontractor.
   h. Name of supplier.
   i. Name of manufacturer.
   j. Number and title of appropriate Specification Section.
   k. Drawing number and detail references, as appropriate.
   l. Location(s) where product is to be installed, as appropriate.
   m. Related physical samples submitted directly.
   n. Other necessary identification.

5. Include the following information as keywords in the electronic file metadata:
a. Project name.
b. Number and title of appropriate Specification Section.
c. Manufacturer name.
d. Product name.

E. Options: Identify options requiring selection by the Architect.

F. Deviations: Identify deviations from the Contract Documents on submittals.

G. Transmittal: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will discard submittals received from sources other than Contractor. Retain subparagraph above or first subparagraph below. Retain below if transmittal forms typically used by contractors are acceptable; otherwise, retain above. Above is more common.

1. Transmittal Form: Provide locations on form for the following information:
   a. Project name.
   b. Date.
   c. Destination (To:).
   d. Source (From:).
   e. Contractor's signed approval.
   f. Names of subcontractor, manufacturer, and supplier.
   g. Category and type of submittal.
   h. Submittal purpose and description.
   i. Specification Section number and title.
   j. Indication of full or partial submittal.
   k. Drawing number and detail references, as appropriate.
   l. Transmittal number.
   m. Submittal and transmittal distribution record.
   n. Remarks.
   o. Signature of transmitter.

2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
   1. Note date and content of previous submittal.
   2. Note date and content of revision in label or title block and clearly indicate extent of revision.
   3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
J. Use for Construction: Use only final submittals that are marked with approval notation from Architect’s action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
1. Post electronic submittals as PDF electronic files directly to Project Web site specifically established for Project.
2. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 - Closeout Procedures.
3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
   a. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated.
   b. Provide a notarized statement on original paper copy certificates and certifications where indicated.
4. Test and Inspection Reports Submittals: Comply with requirements specified in Section 014000 - Quality Requirements.

B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
2. Mark each copy of each submittal to show which products and options are applicable and delete or strikeout references to information not applicable.
3. Include the following information, as applicable:
   a. Manufacturer’s catalog cuts.
   b. Manufacturer’s product specifications.
      1) If specifications are submitted; completely edited the manufacturer’s specification to correspond to identify data applicable to the Work and delete not applicable information.
   c. Standard color charts.
   d. Statement of compliance with specified referenced standards.
   e. Testing by recognized testing agency.
   f. Application of testing agency labels and seals.
   g. Notation of coordination requirements.
   h. Availability and delivery time information.
4. For equipment, include the following in addition to the above, as applicable:
   a. Wiring diagrams showing factory-installed wiring.
b. Printed performance curves.
c. Operational range diagrams.
d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.
6. Submit Product Data in the following format:
   a. PDF electronic file.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
   1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
      a. Identification of products.
      b. Schedules.
      c. Compliance with specified standards.
      d. Notation of coordination requirements.
      e. Notation of dimensions established by field measurement.
      f. Relationship and attachment to adjoining construction clearly indicated.
      g. Seal and signature of professional engineer if specified.
   2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 42 inches (750 by 1067 mm).
   3. Submit Shop Drawings in the following format:
      a. PDF electronic file.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
   1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
   2. Identification: Attach label on unexposed side of Samples that includes the following:
      a. Generic description of Sample.
      b. Product name and name of manufacturer.
      c. Sample source.
      d. Number and title of applicable Specification Section.
   3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
      a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
      b. Samples not incorporated into the Work, or otherwise designated as Owner’s property, are the property of Construction Manager.
   4. Samples for Initial Selection: Submit manufacturer’s color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
a. **Number of Samples:** Submit three full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

5. **Samples for Verification:** Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

a. **Number of Samples:** Submit three sets of Samples. Architect will retain one Sample sets; remainder will be returned.

1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.

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

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E. **Construction Manager's Construction Schedule:** Comply with requirements specified in Section 01013200 - Construction Progress Documentation.

F. **Application for Payment:** Comply with requirements specified in Section 012900 - Payment Procedures.

G. **Schedule of Values:** Comply with requirements specified in Section 012900 - Payment Procedures.

H. **Subcontract List:** Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use CSI Form 1.5A. Include the following information in tabular form:

1. Name, address, and telephone number of entity performing subcontract or supplying products.
2. Number and title of related Specification Section(s) covered by subcontract.
3. Drawing number and detail references, as appropriate, covered by subcontract.
4. Submit subcontract list in the following format:
   a. PDF electronic file.

I. **Sustainable Design Submittals:** Comply with requirements specified in Section 018113 - Sustainable Design Requirements.

1. Submit sustainable design submittals in the following format:
   a. PDF electronic file.

J. **Coordination Drawings:** Comply with requirements specified in Section 013100 - Project Management and Coordination.
K. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.


M. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

N. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

O. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

P. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

Q. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.

R. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

S. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
   1. Name of evaluation organization.
   2. Date of evaluation.
   3. Time period when report is in effect.
   4. Product and manufacturers’ names.
   5. Description of product.
   6. Test procedures and results.
   7. Limitations of use.

T. Schedule of Tests and Inspections: Comply with requirements specified in Section 014000 - Quality Requirements.
U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

W. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

X. Maintenance Data: Comply with requirements specified in Section 017832 - Operation and Maintenance Data.

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

2.2 MATERIAL SAFETY DATA SHEETS (MSDSs)

A. Collect and file on the jobsite as required by OSHA and other authorities.

B. Do not submit to the Architect. If the Owner requires that MSDSs be submitted for the Owner's purposes, submit directly to the Owner, without passing through the Architect.

2.3 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
   1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally-signed PDF electronic file and three paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
   1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Section 017700 - Closeout Procedures.

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S AND CONSTRUCTION MANAGER'S ACTION

A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.

B. Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately as follows:

1. "Approved": The submittal is approved and no further submittal is required.

2. "Approved as Noted" (No Resubmission Necessary): The submittal is approved, with minor corrections marked or noted. No further submittal is required, except that if the noted corrections are made on the original by the Contractor before distribution, then two copies shall be forwarded to the Architect for record.

3. "Partially Approved As Noted" (Revise and Resubmit As Noted): Portions of the submittal are acceptable and approved, as noted; however, there are other portions which are not approved, or yet to be provided. Those portions not approved or incomplete must be resubmitted as noted. Contractor may, at the Contractor's discretion and risk, proceed with ordering or installation of the approved portions but must resubmit as noted by the Architect. The submittal, in its entirety, will be approved only upon acceptable submission of non-approved or missing portions, assuming that nothing in the resubmittal conflicts with the previously approved portions.

4. "Not Approved" (Revise and Resubmit As Noted): This submittal does not meet the requirements of the Contract Documents. Resubmit information on an item, component, or layout that will conform to the requirements of the Contract Documents.

5. "No Action Required" (For Information Only): This submittal is not required by the Contract Documents, or was provided for information purposes only, or no action has been requested by the Contractor. A copy has been retained by the Architect, and a copy is being returned "with no action taken".
6. "Reviewed Only For:" Only the portions of this submittal which are subject to conformance to a particular A/E discipline’s Contract Documents have been reviewed and action taken accordingly. Refer to associated comments as noted for specific A/E review action taken.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are not acceptable, will be considered nonresponsive, and will be returned without review.

E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION
SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

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

C. Related Sections:
   1. 013200 - Construction Progress Documentation: For developing a schedule of required tests and inspections.
      a. Does not apply to Issue 1.
   2. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
1. Laboratory Mockups: Full-size, physical assemblies constructed at testing facility to verify performance characteristics.

2. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on the project site, consisting of multiple products, assemblies and subassemblies.

3. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

D. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.

E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.

G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Construction Manager or another entity engaged by Construction Manager as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 SUBMITTALS

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

B. Construction Manager's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

C. Construction Manager's Quality-Control Manager Qualifications: For supervisory personnel.

D. Construction Manager's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems.
   1. Seismic-force resisting system, designated seismic system, or component listed in the designated seismic system quality assurance plan prepared by the Architect.
   2. Main wind-force resisting system or a wind-resisting component listed in the wind-force-resisting system quality assurance plan prepared by the Architect.

E. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

F. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
   1. Specification Section number and title.
   2. Entity responsible for performing tests and inspections.
   3. Description of test and inspection.
   4. Identification of applicable standards.
   5. Identification of test and inspection methods.
   6. Number of tests and inspections required.
   7. Time schedule or time span for tests and inspections.
   8. Requirements for obtaining samples.
   9. Unique characteristics of each quality-control service.
1.5 CONSTRUCTION MANAGER'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Construction Manager's quality-assurance and quality-control responsibilities. Coordinate with Construction Manager's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
   1. Project quality-control manager may also serve as Project superintendent.

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: Include in quality-control plan a comprehensive schedule of Work requiring testing or inspection, including the following:
   1. Construction Manager-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Construction Manager-elected tests and inspections.
   2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
   3. Owner-performed tests and inspections indicated in the Contract Documents.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.6 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
   1. Date of issue.
   2. Project title and number.
   3. Name, address, and telephone number of testing agency.
   4. Dates and locations of samples and tests or inspections.
   5. Names of individuals making tests and inspections.
   6. Description of the Work and test and inspection method.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
   1. Name, address, and telephone number of technical representative making report.
   2. Statement on condition of substrates and their acceptability for installation of product.
   3. Statement that products at Project site comply with requirements.
   4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
   5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   6. Statement whether conditions, products, and installation will affect warranty.
   7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
   1. Name, address, and telephone number of factory-authorized service representative making report.
   2. Statement that equipment complies with requirements.
   3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   4. Statement whether conditions, products, and installation will affect warranty.
   5. Other required items indicated in individual Specification Sections.

D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

1.7 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.

F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
   1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
   1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
   2. NVLAP: A testing agency accredited according to NIST’s National Voluntary Laboratory Accreditation Program.

H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Construction Manager responsibilities include the following:
   a. Provide test specimens representative of proposed products and construction.
   b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
   c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
   d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
   e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
   f. When testing is complete, remove test specimens, assemblies, mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Construction Manager. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
   1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
   2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
   3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at the Project.
   4. Demonstrate the proposed range of aesthetic effects and workmanship.
   5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
      a. Allow fourteen days for initial review and each re-review of each mockup.
   6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   7. Demolish and remove mockups when directed, unless otherwise indicated.

L. Integrated Exterior Mockups: Construct integrated exterior mockup in accordance with approved Shop Drawings. Coordinate installation of exterior envelope materials and products for which mockups are required in individual specification sections, along with supporting materials.

M. Room Mockups: Construct room mockups incorporating required materials and assemblies, finished in accordance with requirements. Provide required lighting and additional lighting where required to enable Architect to evaluate quality of the Work. Provide room mockups of the following rooms:
   1. As selected by Architect.
1.8 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
   1. Owner will furnish Construction Manager with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
   2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.
   3. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Construction Manager, and the Contract Sum will be adjusted by Change Order.

B. Construction Manager Responsibilities: Tests and inspections not explicitly assigned to Owner are Construction Manager's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
   1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Construction Manager by authorities having jurisdiction, whether specified or not.
   2. Where services are indicated as Construction Manager's or Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
      a. Construction Manager and Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
   3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
   4. Where quality-control services are indicated as Construction Manager's responsibility, submit a certified written report, in duplicate, of each quality-control service.
   5. Testing and inspecting requested by Construction Manager and not required by the Contract Documents are Construction Manager's responsibility.
   6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 013300 - Submittal Procedures.

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Construction Manager's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

F. Testing Agency Responsibilities: Cooperate with Architect, Construction Manager, and trade contractors in performance of duties. Provide qualified personnel to perform required tests and inspections.
   1. Notify Architect and Construction Manager promptly of irregularities or deficiencies observed in the Work during performance of its services.
   2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
   3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
   4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Construction Manager.
   5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
   6. Do not perform any duties of Construction Manager.

G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
   1. Access to the Work.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
   4. Facilities for storage and field curing of test samples.
   5. Delivery of samples to testing agencies.
   6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
   7. Security and protection for samples and for testing and inspecting equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
   1. Schedule times for tests, inspections, obtaining samples, and similar activities.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of the Construction Manager's quality-control plan. Coordinate and submit concurrently with Construction Manager's construction schedule. Update as the Work progresses.
   1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.
1.9 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility ofOwner.

B. Special Tests and Inspections: Conducted by a qualified testing agency as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
   1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
   2. Notifying Architect and Construction Manager promptly of irregularities and deficiencies observed in the Work during performance of its services.
   3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Construction Manager and to authorities having jurisdiction.
   4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
   5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
   6. Retesting and reinspecting corrected work.
   7. .

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONCRETE MOIST BOX

A. Concrete moist box (curing box) for temporarily holding concrete test cylinders at job site to be provided and maintained by trade contractor responsible for Section 033000 - Cast-in-place Concrete. Moist box to be constructed as required to maintain curing conditions (both temperature and humidity) recommended by the American Concrete Institute (ACI) during all weather conditions and be of sufficient size to hold all cylinders molded during a 48 hour period. Moist box to be located in a protected area and on stable foundation to assure no damage to uncured cylinders will occur from exterior bumping or settling.

3.2 TEST AND INSPECTION LOG

A. Prepare a record of tests and inspections. Include the following:
   1. Date test or inspection was conducted.
   2. Description of the Work tested or inspected.
   3. Date test or inspection results were transmitted to Architect.
   4. Identification of testing agency or special inspector conducting test or inspection.
B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect’s reference during normal working hours.

3.3 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
   1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 017300 - Execution.

B. Protect construction exposed by or for quality-control service activities.

C. Repair and protection are Construction Manager’s responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION
SECTION 014200 - REFERENCES

PART 1 - GENERAL

1.1 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

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

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

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

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

F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

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

H. "Provide": Furnish and install, complete and ready for the intended use.

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

J. The term "Contractor" shall be understood to mean Construction Manager who holds the trade contracts.

1.2 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.3 ABBREVIATIONS AND ACRONYMS

A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books’ "National Trade & Professional Associations of the United States."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.

B. Related Sections:
   1. Section 011000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.

B. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.3 SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.

B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Construction Manager's personnel responsible for management of fire prevention program.

1.4 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide concrete or galvanized-steel bases for supporting posts.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.3 EQUIPMENT

A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostat control.
   1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
   2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.
3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 017700 "Closeout Procedures".

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
   1. Locate facilities to limit site disturbance as specified in Section 011000 "Summary."

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.
   1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
   1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.

E. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
   1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
F. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

G. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

H. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
   1. Install electric power service underground unless otherwise indicated.
   2. Connect temporary service to Owner's existing power source, as directed by Owner.

I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
   1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

J. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
   1. Provide additional telephone lines for the following:
      a. Provide a dedicated telephone line for each facsimile machine in each field office.
   2. At each telephone, post a list of important telephone numbers.
      a. Police and fire departments.
      b. Ambulance service.
      c. Construction Manager's home office.
      d. Construction Manager's emergency after-hours telephone number.
      e. Architect's office.
      f. Engineers' offices.
      g. Owner's office.
      h. Principal subcontractors' field and home offices.
   3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
   1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet (9 m) of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas adequate for construction operations. Locate temporary roads and paved areas within construction limits indicated on Drawings.
   1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.

C. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
   1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
   2. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.

D. Traffic Controls: Comply with requirements of authorities having jurisdiction.
   1. Protect existing site improvements to remain including curbs, pavement, and utilities.
   2. Maintain access for fire-fighting equipment and access to fire hydrants.

E. Parking: Provide temporary parking areas for construction personnel.

F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
   1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
   2. Remove snow and ice as required to minimize accumulations.

G. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
   1. Identification Signs: Provide Project identification signs as indicated on Drawings.
   2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
      a. Provide temporary, directional signs for construction personnel and visitors.
   3. Maintain and touchup signs so they are legible at all times.

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 017300 "Execution."

I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Temporary Erosion and Sedimentation Control: Comply with requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Comply with requirements specified in Section 015639 "Temporary Tree and Plant Protection."

F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

G. Site Enclosure Fence: Prior to commencing earthwork, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
   1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
   2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish one set of keys to Owner.

H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.
   1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.
   1. Prohibit smoking in construction areas.
   2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
   3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
   4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

3.5 MOISTURE AND MOLD CONTROL


B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
   1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
   2. Keep interior spaces reasonably clean and protected from water damage.
   3. Discard or replace water-damaged and wet material.
   4. Discard, replace, or clean stored or installed material that begins to grow mold.
   5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
   1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
2. Remove materials that cannot be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.
   1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are property of Construction Manager's. Owner reserves right to take possession of Project identification signs.
   2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 017700 "Closeout Procedures."

END OF SECTION
SECTION 015639 - TEMPORARY TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general protection and pruning of existing trees and plants that are affected by execution of the Work, whether temporary or permanent construction.

B. Related Sections:
   1. 01 5000 - Temporary Facilities and Controls: For temporary site fencing.
   2. Division 31 Section "Site Clearing" for removing existing trees and shrubs.

1.2 DEFINITIONS

A. Caliper: Diameter of a trunk measured by a diameter tape at 6 inches (150 mm) above the ground for trees up to, and including, 4-inch (100-mm) size; and 12 inches (300 mm) above the ground for trees larger than 4-inch (100-mm) size.

B. Plant-Protection Zone: Area surrounding individual trees, groups of trees, shrubs, or other vegetation to be protected during construction, and indicated on Drawings.

C. Tree-Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by a circle concentric with each tree with a radius 1.5 times the diameter of the drip line unless otherwise indicated.

D. Vegetation: Trees, shrubs, groundcovers, grass, and other plants.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Samples for Verification: For each type of the following:
   2. Protection-Zone Fencing: Assembled Samples of manufacturer's standard size made from full-size components.

C. Qualification Data: For qualified arborist and tree service firm.

D. Certification: From arborist, certifying that trees indicated to remain have been protected during construction according to recognized standards and that trees were promptly and properly treated and repaired when damaged.

E. Maintenance Recommendations: From arborist, for care and protection of trees affected by construction during and after completing the Work.
F. Existing Conditions: Documentation of existing trees and plantings indicated to remain, which establishes preconstruction conditions that might be misconstrued as damage caused by construction activities.
   1. Use sufficiently detailed photographs or videotape.
   2. Include plans and notations to indicate specific wounds and damage conditions of each tree or other plants designated to remain.

1.4 QUALITY ASSURANCE

A. Arborist Qualifications: Certified Arborist as certified by ISA.

B. Tree Service Firm Qualifications: An experienced tree service firm that has successfully completed temporary tree and plant protection work similar to that required for this Project and that will assign an experienced, qualified arborist to Project site during execution of the Work.

C. Preinstallation Conference: Conduct conference at Project site.
   1. Review methods and procedures related to temporary tree and plant protection including, but not limited to, the following:
      a. Construction schedule. Verify availability of materials, personnel, and equipment needed to make progress and avoid delays.
      b. Enforcing requirements for protection zones.
      c. Arborist's responsibilities.
      d. Field quality control.

1.5 PROJECT CONDITIONS

A. The following practices are prohibited within protection zones:
   1. Storage of construction materials, debris, or excavated material.
   2. Parking vehicles or equipment.
   3. Foot traffic.
   4. Erection of sheds or structures.
   5. Impoundment of water.
   6. Excavation or other digging unless otherwise indicated.
   7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

B. Do not direct vehicle or equipment exhaust toward protection zones.

C. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones and organic mulch.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: Provide in conformance with Section329113- Soil Preparation.
B. Organic Mulch: Free from deleterious materials and suitable as a top dressing for trees and shrubs, consisting of one of the following:
   1. Type: Shredded hardwood.
   2. Size Range: 3 inches (76 mm) maximum, 1/2 inch (13 mm) minimum.

C. Protection-Zone Fencing: Fencing fixed in position and meeting the following requirements.
   1. Chain-Link Protection-Zone Fencing: Galvanized-steel fencing fabricated from minimum 2-inch (50-mm) opening, 0.148-inch- (3.76-mm-) diameter wire chain-link fabric; with pipe posts, minimum 2-3/8-inch- (60-mm-) OD line posts, and 2-7/8-inch- (73-mm-) OD corner and pull posts; with 0.177-inch- (4.5-mm-) diameter top tension wire and 0.177-inch- (4.5-mm-) diameter bottom tension wire; with tie wires, hog ring ties, and other accessories for a complete fence system.
      a. Height: 6 feet (1.8 m).
   2. Gates: Single swing access gates matching material and appearance of fencing, to allow for maintenance activities within protection zones; leaf width 30 or 36 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Erosion and Sedimentation Control: Examine the site to verify that temporary erosion- and sedimentation-control measures are in place. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross protection zones.

B. For the record, prepare written report, endorsed by arborist, listing conditions detrimental to tree and plant protection.

3.2 PREPARATION

A. Locate and clearly identify trees, shrubs, and other vegetation to remain. Tie three 1-inch (25-mm) blue-vinyl tape around each tree trunk at 54 inches (1372 mm) above the ground and spaced evenly around the tree trunk.

B. Protect tree root systems from damage caused by runoff or spillage of noxious materials while mixing, placing, or storing construction materials. Protect root systems from ponding, eroding, or excessive wetting caused by dewatering operations.

C. Tree-Protection Zones: Mulch areas inside tree-protection zones and other areas indicated.
   1. Apply 2-inch average thickness of organic mulch. Do not place mulch within 6 inches (150 mm) of tree trunks.
3.3 TREE- AND PLANT-PROTECTION ZONES

A. Protection-Zone Fencing: Install protection-zone fencing along edges of protection zones in a manner that will prevent people and animals from easily entering protected area except by entrance gates. Construct fencing so as not to obstruct safe passage or visibility at vehicle intersections where fencing is located adjacent to pedestrian walkways or in close proximity to street intersections, drives, or other vehicular circulation.
   1. Chain-Link Fencing: Install to comply with ASTM F 567 and with manufacturer's written instructions.
   2. Posts: Set or drive posts into ground one-third the total height of the fence without concrete footings. Where a post is located on existing paving or concrete to remain, provide appropriate means of post support acceptable to Architect.
   3. Access Gates: Install at safest access point adjust to operate smoothly, easily, and quietly, free of binding, warp, excessive deflection, distortion, nonalignment, misplacement, disruption, or malfunction, throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

B. Maintain protection zones free of weeds and trash.

C. Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.

D. Maintain protection-zone fencing and signage in good condition as acceptable to Architect and remove when construction operations are complete and equipment has been removed from the site.
   1. Do not remove protection-zone fencing, even temporarily, to allow deliveries or equipment access through the protection zone.
   2. Temporary access is permitted subject to preapproval in writing by arborist if a root buffer effective against soil compaction is constructed as directed by arborist. Maintain root buffer so long as access is permitted.

3.4 EXCAVATION

A. General: Excavate at edge of protection zones and for trenches indicated within protection zones according to requirements with earthwork section in Division 31.

B. Trenching near Trees: Where utility trenches are required within protection zones, hand excavate under or around tree roots or tunnel under the roots by drilling, auger boring, or pipe jacking. Do not cut main lateral tree roots or taproots; cut only smaller roots that interfere with installation of utilities. Cut roots as required for root pruning.

C. Redirect roots in backfill areas where possible. If encountering large, main lateral roots, expose roots beyond excavation limits as required to bend and redirect them without breaking. If encountered immediately adjacent to location of new construction and redirection is not practical, cut roots approximately 3 inches back from new construction and as required for root pruning.
D. Do not allow exposed roots to dry out before placing permanent backfill. Provide temporary earth cover or pack with peat moss and wrap with burlap. Water and maintain in a moist condition. Temporarily support and protect roots from damage until they are permanently relocated and covered with soil.

3.5 ROOT PRUNING

A. Prune roots that are affected by temporary and permanent construction. Prune roots as directed by arborist and as follows:
   1. Cut roots manually by digging a trench and cutting exposed roots with sharp pruning instruments; do not break, tear, chop, or slant the cuts. Do not use a backhoe or other equipment that rips, tears, or pulls roots.
   2. Cut Ends: Coat cut ends of roots more than 1-1/2 inches (38 mm) in diameter with coating approved by arborist.
   3. Temporarily support and protect roots from damage until they are permanently redirected and covered with soil.
   4. Cover exposed roots with burlap and water regularly.
   5. Backfill as soon as possible according to requirements in Division 31 Section "Earth Moving."

B. Root Pruning at Edge of Protection Zone: Prune roots by cleanly cutting all roots to the depth of the required excavation, and as directed by arborist.

C. Root Pruning within Protection Zone: Clear and excavate by hand to the depth of the required excavation to minimize damage to root systems. Use narrow-tine spading forks, comb soil to expose roots, and cleanly cut roots as close to excavation as possible.

3.6 CROWN PRUNING

A. Prune branches that are affected by temporary and permanent construction. Prune branches as follows:
   1. Prune trees to remain to compensate for root loss caused by damaging or cutting root system. Provide subsequent maintenance during Contract period as recommended by arborist.
   2. Pruning Standards: Prune trees according to ANSI A300 (Part 1) and the following:
      a. Type of Pruning: As necessary.
      b. Specialty Pruning: Restoration.
   3. Cut branches with sharp pruning instruments; do not break or chop.
   4. Do not apply pruning paint to wounds.

B. Chip removed branches and dispose of off-site.

3.7 REGRADING

A. Lowering Grade: Where new finish grade is indicated below existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.
B. Lowering Grade within Protection Zone: Where new finish grade is indicated below existing grade around trees, slope grade away from trees as recommended by arborist unless otherwise indicated.
   1. Root Pruning: Prune tree roots exposed by lowering the grade. Do not cut main lateral roots or taproots; cut only smaller roots. Cut roots as required for root pruning.

C. Raising Grade: Where new finish grade is indicated above existing grade around trees, slope grade beyond the protection zone. Maintain existing grades within the protection zone.

D. Minor Fill within Protection Zone: Where existing grade is 2 inches (50 mm) or less below elevation of finish grade, fill with topsoil. Place topsoil in a single uncompacted layer and hand grade to required finish elevations.

3.8 FIELD QUALITY CONTROL

A. Inspections: Engage a qualified arborist to direct plant-protection measures in the vicinity of trees, shrubs, and other vegetation indicated to remain and to prepare inspection reports.

3.9 REPAIR AND REPLACEMENT

A. General: Repair or replace trees, shrubs, and other vegetation indicated to remain or be relocated that are damaged by construction operations, in a manner approved by Architect.
   1. Submit details of proposed root cutting and tree and shrub repairs.
   2. Have arborist perform the root cutting, branch pruning, and damage repair of trees and shrubs.
   3. Treat damaged trunks, limbs, and roots according to arborist's written instructions.
   4. Perform repairs within 24 hours.
   5. Replace vegetation that cannot be repaired and restored to full-growth status, as determined by Architect.

B. Trees: Remove and replace trees indicated to remain that are more than 66 percent dead or in an unhealthy condition or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern. Do not remove any tree without written permission by Owner.
   1. Provide new trees of same size and species as those being replaced for each tree that measures 4 inches (100 mm) or smaller in caliper size.
   2. Provide one new tree(s) of 6-inch (150-mm) caliper size for each tree being replaced that measures more than 4 inches (100 mm) in caliper size.
      a. Species: Species selected by Architect.
   3. Plant and maintain new trees as specified in Division 32 Section "Plants."
C. Soil Aeration: Where directed by Architect, aerate surface soil compacted during construction. Aerate 10 feet (3 m) beyond drip line and no closer than 36 inches (900 mm) to tree trunk. Drill 2-inch- (50-mm-) diameter holes a minimum of 12 inches (300 mm) deep at 24 inches (600 mm) o.c. Backfill holes with an equal mix of augered soil and sand.

3.10 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Disposal: Remove excess excavated material, displaced trees, trash and debris, and legally dispose of them off Owner's property.

END OF SECTION
SECTION 016000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

B. Related Sections:
   1. 012500 - Substitution Procedures: For requests for substitutions.
   2. 014200 - References: For applicable industry standards for products specified.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased or acquired stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
   1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, current as of date of the Contract Documents.
   2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
   3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
   a. Form of Approval: As specified in Section 013300 - Submittal Procedures.
   b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 013300-Submittal Procedures. Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
   1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
   2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:
   1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
   2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
   3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
   4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:
   1. Store products to allow for inspection and measurement of quantity or counting of units.
   2. Store materials in a manner that will not endanger Project structure.
   3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
4. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
3. Refer to Divisions 02 through 49. Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 017700 - Closeout Procedures.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Architect will make selection.
B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.

3. Products:
   a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered, unless otherwise indicated.
      1) Where the list of products or manufactures list "comparable Product" the list for that specification section is not restricted; and products by other manufacturers can be submitted as a "Comparable Product" as follows:
         a) Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.

4. Manufacturers:
   a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered, unless otherwise indicated.

5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 - Substitution Procedures for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.
2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
3. Evidence that proposed product provides specified warranty.
4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
   2. Field engineering and surveying.
   3. Installation of the Work.
   4. Cutting and patching.
   5. Coordination of Owner-installed products.
   6. Progress cleaning.
   7. Starting and adjusting.
   8. Protection of installed construction.

B. Related Requirements:
   1. Section 011000 "Summary" for limits on use of Project site.
   2. Section 017700 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
   3. Section 078413 "Penetration Firestopping" for patching penetrations in fire-rated construction.
      a. Does not apply to Issue 1.

1.2 SUBMITTALS

A. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.

B. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

C. Certified Surveys: Submit two copies signed by land surveyor.

1.3 QUALITY ASSURANCE

A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
   a. 
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
   a. Insert operating system.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.
B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
   1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
   1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
   2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
   1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
   2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
   3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

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

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
   1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
   2. Establish limits on use of Project site.
   3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
   4. Inform installers of lines and levels to which they must comply.
5. Check the location, level and plumb, of every major element as the Work progresses.
6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
   1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.

C. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
   1. Make vertical work plumb and make horizontal work level.
   2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
   3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
C. **Protect concrete floor from staining and other damage until substantial completion.** Cutting of pipe and similar operations that may stain flooring shall not be done at locations scheduled to have a resilient sheet flooring or carpeting as the finished floor covering.

D. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

E. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

F. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

G. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

H. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.

I. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
   2. Allow for building movement, including thermal expansion and contraction.
   3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

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

K. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 **OVERHEAD ATTACHMENTS**

A. For required hangers each trade to provide one or more of the following:
   1. Concrete inserts prior to placement of concrete.
   2. Trapeze from adjacent structure with suitable steel framing.
a. Connections to Structure: Suitable anchorage devices with a minimum load carrying capacity of 250 lbs. plus a safety factor of 4:1 for the applied load:
b. Concrete: Steel expansion anchors. See PROHIBITED MATERIAL & METHODS below.
c. Steel: Bolted or welded connections to steel structure.

B. Where metal floor deck is furnished with hangar tabs or similar devices, applied total load, including work of other trades, not to exceed 75 lbs. for each device. Loads in excess of permitted limit to be supported by trapeze framing as specified above.

C. Verify support requirements of heavy or unusual loads not specifically shown on drawings with Architect.

3.7 PROHIBITED MATERIALS AND METHODS

A. The following items are expressly prohibited:

B. Core Drilling: Not permitted unless approved by Structural Engineer.

C. Attachment Related Items:
   1. Ballistic Fasteners: Ballistic fasteners are defined as anchors which are driven into place by any device which produces an impact force by use of a powder charge, compressed air, gas or any other propellant. Ballistic fasteners prohibited for the following conditions:
      a. Attachment of structural members.
      b. Where public may be endangered by misuse.
   2. Suspension systems which are not independently supported:
      a. Ceiling grid systems shall not be supported from ductwork, electrical conduit, heating or plumbing lines, and vice versa.
      b. Each utility system and the ceiling grid system shall be a separate installation and each shall be independently supported from the building structure.
      c. Where interference occurs, provide trapeze type hangers or other suitable supports for each system.
      d. Locate hangers and supports where they will not interfere with access to mixing boxes, fire dampers, valves, and other appurtenances requiring servicing.
      e. See OVERHEAD ATTACHMENTS above.
   3. Plug anchorage by use of wood, lead, or plastic.
   4. Perforated steel strap iron for pipe or other support or anchorage.
   5. Penetration of cellular (electrical) deck by fasteners or welding except as required for installation of deck system and associated electrical work.

D. Methods Related Items:
   1. The penetration of floors and of walls by pipes, ducts, or other penetrations unless openings are appropriately fire stopped by fire doors, or fire dampers, and voids around pipes, ducts, conduits, etc. are sealed with fireproof materials.
2. The use of ink marking pens on surfaces of any kind of materials receiving paint or other finish in exposed location.
3. Use of jack hammers or other similar equipment which can cause structure-borne vibration detrimental to the use of the existing facilities, (i.e.: surgical functions).

E. Materials Related Items:
1. Asbestos.
2. Mercury. Include equipment, products, and devices containing mercury including, but not limited to, medical equipment, batteries, switches, and lamps.
3. Barbed wire in construction fencing.
4. Water soluble treatment of insulation jackets or facing, to impede or retard flame or smoke.

F. Earthwork Related Items:
1. Use of explosives or blasting as a constructing practice is prohibited except as may be approved in writing by the Owner for special cases of demolition or excavation.

G. Grits or similar flowable material as backfill.

H. Masonry Related Items:
1. Masonry reinforcement of the chicken wire type.
2. Unit masonry made of cinders, i.e.: cinder block.
3. Acid for masonry cleaning.

I. Door Related Items:
1. Mineral core labeled wood doors.
2. KD door frames.
3. Narrow stile and narrow bottom rail aluminum doors.
4. Thresholds raised more than 1/2” at doors intended to be handicap accessible.
5. Floor mounted door stops.
6. Door closers with integral smoke detectors except for automatic door equipment specified in Section 087113.

J. Related Items:
1. Fire protection systems with nonferrous tube, pipe or fittings.
2. Fire pumps of turbine vane type.
3. Threading of pipe made of cast or ductile iron.
5. Wet piping systems (i.e.: water, sewer, steam, drain, sprinkler, condensate, etc.) installed over electrical switchgear, transformers, motor control centers, radiology rooms, and elevator equipment.
6. Cast iron and brass HVAC lines with pressures higher than 125 psig or temperatures greater than 350 degrees F.
7. Condensate drip traps above 15 psig designed to discharge into condensate return mains or condensate pump receivers.
8. Acoustic lining or insulation on interior of ductwork except in limited scope as specifically indicated.
9. Victaulic or grooved-type joints in dry-pipe fire protection systems.
10. Glass waste piping under slabs or underground.
11. Variable drive pulleys used with 5 hp and larger motors.

K. Electrical Related Items:
1. Electrical wire connectors insulated with hard bakelite or ceramic materials.
2. Aluminum wire for electrical work except that aluminum bus bar may be used if so specified.
3. Aluminum conduit.
4. Plastic conduit for interior use.
5. Extra-flexible non-labeled conduit.
6. Aluminum electrical fittings and boxes used with steel conduit or use of any other incompatible materials.
7. Underground electrical ducts that pass or cross above gas piping.
8. Wood ties to support conduit.
9. Wood strips or wood screws to support lighting fixtures.
10. Piggy back suspension systems for conduits, fixtures, etc. Refer to Suspension systems above in this Article: J fuses for electric service disconnect.

3.8 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.

4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.

5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.9 ELEVATORS

A. Hoistway:

1. Clear, plumb with variations not to exceed 1/2" at any point.

2. 75 degree bevel guards on all projections, recesses or setbacks over 2" except for loading or unloading.

3. Structural supports for rail brackets at pit, each floor and roof.

4. Reinforcing as needed for hoistway entrances.
5. Recesses, supports, and patching, as required, to accommodate hall button boxes, signal fixtures, etc.
6. All barricades outside elevator hoistways as required.
7. Hoistway Partitions: Install only mechanical and electrical items associated with elevator at or in partition. Locate other items as directed by Architect to location compliant with building code.

B. Elevator Pit:
1. Dry pit reinforced to sustain normal vertical forces from rails and buffers. See applicable waterproofing section in Division 7.
2. Pit Sump: One required for each elevator pit.
   a. Size: 24 inch square x 24 inch deep.
   b. Location: Rear corner, as approved by Architect and elevator manufacturer; integral with elevator pit walls.
      1) Floor/Footing: Integral with elevator pit footing; dowel walls to footing with minimum two #4 reinforcing bars each wall.
      2) Walls: Same as elevator pit walls. Extend typical wall reinforcing into sump walls; minimum one #4 bar at top and bottom.
3. Waterproofing: Provide a waterproof envelope around elevator pit and walls and extend waterproofing up to underside of floor slab; unless indicated otherwise. See applicable waterproofing section in Division 7. Verify extent of elevator pit waterproofing.

3.10 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
   2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
   3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.

B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.11 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements"

3.12 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

B. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION
SECTION 017700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Substantial Completion procedures.
   2. Final completion procedures.
   3. Warranties.
   4. Final cleaning.

B. Related Sections:
   1. 017300 - Execution: For progress cleaning of Project site.
   2. 017823 - Operation and Maintenance Data: For operation and maintenance manual requirements.
   3. 017839 - Project Record Documents: For submitting record Drawings, record Specifications, and record Product Data.
   4. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.2 SUBMITTALS

A. Product Data: For cleaning agents.

B. Construction Manager's List of Incomplete Items: Initial submittal at Substantial Completion.

C. Certified List of Incomplete Items: Final submittal at Final Completion.

D. Certificates of Release: From authorities having jurisdiction.

E. Certificate of Insurance: For continuing coverage.

F. Field Report: For pest control inspection.

G. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

1.3 SUBSTANTIAL COMPLETION PROCEDURES

A. Construction Manager's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Construction Manager's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.

3. Submit closeout submittals specified in individual Divisions 02 through 33 Sections, including specific warranties, maintenance service agreements, final certifications, and similar documents.

4. Submit maintenance material submittals specified in individual Divisions 02 through 33 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
   a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Owner's signature for receipt of submittals.

5. Submit test/adjust/balance records.

6. Submit sustainable design submittals required in Section 018113 - Sustainable Design Requirements and in individual Division 02 through 33 Sections.

7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.

2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

3. Complete startup and testing of systems and equipment.

4. Perform preventive maintenance on equipment used prior to Substantial Completion.

5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 - Demonstration and Training.

6. Advise Owner of changeover in heat and other utilities.

7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.

8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

9. Complete final cleaning requirements, including touchup painting.

10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to the date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Construction Manager of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Construction Manager of items, either on Construction Manager's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

1.4 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 - Payment Procedures.
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to the date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Construction Manager of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Construction Manager of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Construction Manager that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and then interior spaces.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
3. Include the following information at the top of each page:
   a. Project name.
   b. Date.
c. Name of Architect.
d. Name of Construction Manager.
e. Page number.

4. Submit list of incomplete items in the following format:
a. PDF electronic file and as an Excel spreadsheet.

1.6 WARRANTIES

A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.

B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Construction Manager.

C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
   1. Bind warranties in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
   2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
   3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Construction Manager.
   4. Scan warranties and assemble complete warranty submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.

D. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
   a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
   b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
   c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
   d. Remove tools, construction equipment, machinery, and surplus material from Project site.
   e. Remove snow and ice to provide safe access to building.
   f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
   g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
   h. Sweep concrete floors broom clean in unoccupied spaces.
   i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
   j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
   k. Remove labels that are not permanent.
   l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
   m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
   n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
   o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
q. Leave Project clean and ready for occupancy.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
   a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
   1. Operation and maintenance documentation directory.
   2. Emergency manuals.
   3. Operation manuals for systems, subsystems, and equipment.
   4. Product maintenance manuals.
   5. Systems and equipment maintenance manuals.

B. Related Sections:
   1. 013300 - Submittal Procedures: For submitting copies of submittals for operation and maintenance manuals.
   2. 019113 - General Commissioning Requirements: For verification and compilation of data into operation and maintenance manuals.
   3. Divisions 02 through 49 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.2 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.3 SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
   1. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:
      a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked operation and maintenance directory.
      b. Enable inserted reviewer comments on draft submittals.
C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect and Commissioning Agent will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittals: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect and Commissioning Agent will return copy with comments.
   1. Correct or modify each manual to comply with Architect's and Commissioning Agent's comments. Submit three paper copies and four pdf copies of each corrected manual within 15 days of receipt of Architect's and Commissioning Agent's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
   1. List of documents.
   2. List of systems.
   3. List of equipment.
   4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
   1. Title page.
2. Table of contents.

B. Title Page: Include the following information:
1. Subject matter included in manual.
2. Name and address of Project.
3. Name and address of Owner.
4. Date of submittal.
5. Name and contact information for Construction Manager.
6. Name and contact information for Architect.
7. Name and contact information for Commissioning Agent.
8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
9. Cross-reference to related systems in other operation and maintenance manuals.

C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
2. File Names and Bookmarks: Enable bookmarking of individual documents based upon file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel upon opening file.

F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, [loose-leaf] [post-type] binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.


5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:
   1. Type of emergency.
   2. Emergency instructions.
   3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
   1. Fire.
   2. Flood.
   5. Power failure.
   7. System, subsystem, or equipment failure.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:
   1. Instructions on stopping.
   2. Shutdown instructions for each type of emergency.
   3. Operating instructions for conditions outside normal operating limits.
   4. Required sequences for electric or electronic systems.
   5. Special operating instructions and procedures.
2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
   2. Performance and design criteria if Contractor is delegated design responsibility.
   3. Operating standards.
   4. Operating procedures.
   5. Operating logs.
   6. Wiring diagrams.
   7. Control diagrams.
   8. Piped system diagrams.
   9. Precautions against improper use.
  10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:
   1. Product name and model number. Use designations for products indicated on Contract Documents.
   2. Manufacturer's name.
   3. Equipment identification with serial number of each component.
   4. Equipment function.
   5. Operating characteristics.
   6. Limiting conditions.
   7. Performance curves.
   8. Engineering data and tests.
   9. Complete nomenclature and number of replacement parts.

C. Operating Procedures: Include the following, as applicable:
   1. Startup procedures.
   2. Equipment or system break-in procedures.
   3. Routine and normal operating instructions.
   4. Regulation and control procedures.
   5. Instructions on stopping.
   7. Seasonal and weekend operating instructions.
   8. Required sequences for electric or electronic systems.
   9. Special operating instructions and procedures.

D. Demonstration and Training: Provide labor for miscellaneous demonstration and training support during the warranty term.

E. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

F. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.
2.5 PRODUCT MAINTENANCE MANUALS

A. General: Information for care and maintenance shall be furnished for any item requiring more than ordinary custodial care. For mechanized equipment and electrical equipment, provide operation manuals. For special equipment, in addition to operation manuals, provide the original equipment manufacturers' demonstrations and operating instructions by factory trained employees to designated Owner personnel who will be operating the equipment.

B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties, as described below.

C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

D. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   5. Reordering information for specially manufactured products.

E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
   1. Inspection procedures.
   2. Types of cleaning agents to be used and methods of cleaning.
   3. List of cleaning agents and methods of cleaning detrimental to product.
   4. Schedule for routine cleaning and maintenance.
   5. Repair instructions.

F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

G. Warranties: Include copies of warranties and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual’s table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

C. Manufacturers' Maintenance Documentation: Manufacturers’ maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.
   4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.
   4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
   1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
   2. Maintenance and Service Record: Include manufacturers’ forms for recording maintenance.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Warranties: Include copies of warranties and lists of circumstances and conditions that would affect validity of warranties or bonds.
   1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
   1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
   2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
   1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
   1. Do not use original project record documents as part of operation and maintenance manuals.

F. Comply with Section 017700 - Closeout Procedures for schedule for submitting operation and maintenance documentation.

END OF SECTION
SECTION 017839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for project record documents, including the following:
   1. Record Drawings.
   2. Record Specifications.
   3. Miscellaneous record submittals.

B. Related Sections:
   1. 017700 - Closeout Procedures: For general closeout procedures.
   2. 017823 - Operation and Maintenance Data: For operation and maintenance manual requirements.
   3. Divisions 02 through 49 Sections for specific requirements for project record documents of the Work in those Sections.

1.2 CLOSEOUT SUBMITTALS

A. Record Drawings: Comply with the following:
   1. Number of Copies: Submit one set(s) of marked-up Record prints.
   2. Number of Copies: Submit copies of Record Drawings as follows:
      a. Initial Submittal: Submit one paper copy set and one PDF electronic file of marked-up Record prints. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
      b. Final Submittal: Submit PDF electronic files of marked-up Record prints. Print each Drawing, whether or not changes and additional information were recorded.

B. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
   1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

D. Miscellaneous Record Submittals: Refer to other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.
E. Reports: Submit written report weekly indicating items incorporated in Project record documents concurrent with progress of the Work, including modifications, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained Record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up Record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.

b. Accurately record information in an acceptable drawing technique.

c. Record data as soon as possible after obtaining it.

d. Record and check the markup before enclosing concealed installations.

e. Cross-reference record prints to corresponding archive photographic documentation.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.

b. Revisions to details shown on Drawings.

c. Depths of foundations below first floor.

d. Locations and depths of underground utilities.

e. Revisions to routing of piping and conduits.

f. Revisions to electrical circuitry.

g. Actual equipment locations.

h. Duct size and routing.

i. Locations of concealed internal utilities.

j. Changes made by Change Order and other contract modifications.

k. Changes made following Architect's written orders.

l. Details not on the original Contract Drawings.

m. Field records for variable and concealed conditions.

n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings and Shop Drawings completely and accurately. Utilize personnel proficient at recording graphic information in production of marked-up record prints.

4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

5. Mark important additional information that was either shown schematically or omitted from original Drawings.

6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
7. These Contractor's Record Documents shall be available to the Owner and Architect; and shall be delivered to Architect for use in preparing Architect's Record Drawings upon completion of the work.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up Record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
   1. Format: Annotated PDF electronic file with comment function enabled.
   2. Incorporate changes and additional information previously marked on Record prints. Delete, redraw, and add details and notations where applicable.
   3. Refer instances of uncertainty to Architect through Construction Manager for resolution.
      a. Refer to Section 013300 - Submittal Procedures for requirements related to use of Architect's digital data files.

C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
   1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
   2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

D. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
   1. Format: Annotated PDF electronic file with comment function enabled.
   2. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
   3. Identification: As follows:
      a. Project name.
      b. Date.
      c. Designation "PROJECT RECORD DRAWINGS."
      d. Name of Architect and Construction Manager.
      e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
   1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
5. Note related Change Orders, record Product Data, and record Drawings where applicable.

B. Format: Submit record Specifications as annotated PDF electronic file.

2.3 RECORD PRODUCT DATA

A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
   1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
   2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
   3. Note related Change Orders, record Specifications, and record Drawings where applicable.

B. Format: Submit record Product Data as annotated PDF electronic file.
   1. Include record Product Data directory organized by specification section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

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

B. Format: Submit miscellaneous record submittals as PDF electronic file.
   1. Include miscellaneous record submittals directory organized by specification section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and modifications to project record documents as they occur; do not wait until the end of Project.
B. Maintenance of Record Documents and Samples: Store record documents and samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.
SECTION 017900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Demonstration of operation of systems, subsystems, and equipment.
   2. Training in operation and maintenance of systems, subsystems, and equipment.
   3. Demonstration and training video recordings.

B. Related Sections:
   1. Divisions 02 through 49 Sections for specific requirements for demonstration and training for products in those Sections.

1.2 SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
   1. Indicate proposed training modules utilizing manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Qualification Data: For instructor.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.3 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
   1. Identification: On each copy, provide an applied label with the following information:
      a. Name of Project.
      b. Name and address of videographer.
      c. Name of Architect.
      d. Name of Construction Manager.
      e. Name of trade-contractor.
      f. Date of video recording.
2. Transcript: Prepared on 8-1/2-by-11-inch (215-by-280-mm) paper, punched and bound in heavy-duty, three-ring, vinyl-covered binders. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.

3. At completion of training, submit complete training manual(s) for Owner's use.

1.4 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 - Quality Requirements, experienced in operation and maintenance procedures and training.

C. Videographer Qualifications: A professional videographer who is experienced photographing demonstration and training events similar to those required.

D. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 - Project Management and Coordination. Review methods and procedures related to demonstration and training including, but not limited to, the following:
   1. Inspect and discuss locations and other facilities required for instruction.
   2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
   3. Review required content of instruction.
   4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.
PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   h. Performance curves.

2. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project record documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
k. Seasonal and weekend operating instructions.
l. Required sequences for electric or electronic systems.
m. Special operating instructions and procedures.
5. Adjustments: Include the following:
a. Alignments.
b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
a. Diagnostic instructions.
b. Test and inspection procedures.
7. Maintenance: Include the following:
a. Inspection procedures.
b. Types of cleaning agents to be used and methods of cleaning.
c. List of cleaning agents and methods of cleaning detrimental to product.
d. Procedures for routine cleaning

e. Procedures for preventive maintenance.
f. Procedures for routine maintenance.
g. Instruction on use of special tools.
8. Repairs: Include the following:
a. Diagnosis instructions.
b. Repair instructions.
c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
d. Instructions for identifying parts and components.
e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 - Operations and Maintenance Data.

B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
2. Owner will furnish an instructor to describe Owner's operational philosophy.
3. Owner will furnish Contractor with names and positions of participants.
C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
   1. Schedule training with Owner, through Architect, with at least seven days' advance notice.

D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

E. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
   1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Video Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to Architect.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.

D. Narration: Describe scenes on video recording by audio narration by microphone while dubbing audio narration off-site after video recording is recorded. Include description of items being viewed.

E. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

F. Pre-Produced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION
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SECTION 019113 – GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

1.1 Description

A. Scope – Commissioning for this Columbus Metropolitan Library (CML) Branch includes:
   1. The CxA will provide the Owner with an unbiased, objective view of the system’s installation, operation, and performance. The commissioning process does not take away or reduce the responsibility of the installing Contractors to provide a finished product, installed and fully functional in accordance with the contract documents.
   2. The General Contractor, HVAC Contractor, Plumbing Contractor, Fire Protection Contractor, and the Electrical Contractor shall be responsible for cooperating, and coordinating their work, with the CxA. They shall also be responsible for carrying out all the physical activities required for installation of components and systems, and operating them during the commissioning process as required in this Section.

1.2 GOALS AND OBJECTIVES

A. There are three objectives of this commissioning process:
   1. To support the design process as an owner’s advocate and to achieve a final product that is installed and operated in an energy efficient manner.
   2. To functionally test and verify performance of facility’s key energy and water influencing systems, such as the lighting, building envelope, HVAC equipment and water recycling equipment.
   3. To ensure that the building owners and operators are properly instructed how to efficiently maintain and operate building’s energy and water using systems.

1.3 SYSTEMS TO BE COMMISSIONED

A. The systems to be commissioned are:
   1. The heating and air conditioning equipment and controls,
   2. The lighting system and controls,
   3. The building envelope and insulation (walls, windows and roof),
   4. The building automation system (BAS).
1.4 COMMISSIONING TEAM – ROLES AND RESPONSIBILITIES

A. Commissioning Agent (CxA) – Go Sustainable Energy
   1. Personnel – Eric Boxer, PE, Neil Wittberg, CEM, Jordan Nader
      a. Project Manager – Eric Boxer, PE
      b. Contact – All correspondence should copy Mr. Boxer and Mr. Wittberg.
   2. The Commissioning Agent’s responsibilities will include
      a. Fundamental Commissioning - Developing the commissioning plan (summarized in Part 3 of this section), conducting fundamental tests, verifying system performance, documenting and reporting findings, and approving system functionality.
      b. Enhanced Commissioning - Enhanced commissioning typically includes the following tasks. First, the CxA will assemble operations and maintenance manuals and append any additional documentation for energy efficient operation. Second, the CxA will verify training of lighting, HVAC and conduct any additional training in energy efficient operation of the systems. Finally, a review of the building and process operation will be conducted within 10 months but later than 5 months of substantial completion of the facility. The enhanced commissioning scope is subject to change based upon needs and requests of the building owner.
   3. Go Sustainable Energy will communicate to the construction manager, and owner, key points in the facility construction at which functional testing or system evaluation will be required.

B. Construction Management
   1. It will be the responsibility of the construction manager to communicate construction progress to the CxA and make the site and equipment available for functional testing and system evaluation.

C. Contractors - Lighting, HVAC and General
   1. Communicate installation, start-up and testing dates to the Construction Manager and CxA two weeks prior to date or within a reasonable amount of time.
   2. Provide requested submittals (see point 3.7 in this section, Part 3).
   3. Provide operation and maintenance manuals for equipment.
   4. Provide reasonable training for equipment to facility personnel (see point 3.8 in this section, Part 3).

D. Facility Owner
   1. It will be the responsibility of the facility owner to review inspection and testing reports from Go Sustainable Energy.
   2. The facility owner will be required to signal final acceptance of each system upon receiving approval or recommendations from the CxA.
1.5 COMMUNICATIONS PROTOCOL AND COORDINATION

A. The CxA will communicate directly with the construction manager, architect, design engineer and owner concerning key points in the construction process for inspections, testing or evaluation. These points are outlined in Part 3, Point 3.2 of this section.

1.6 REFERENCE DOCUMENTS

A. Construction Documents

B. ASHRAE 90.1-2010

C. Other commissioning guideline literature may be used, such as ASHRAE commissioning guidelines or “Building Commissioning Guidelines” prepared by Portland Energy Conservation Inc..

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 COMMISSIONING SCHEDULE – MILESTONES

A. Site inspections and equipment functional testing should be completed at the following milestones. Inspection or testing of different systems may be scheduled for the same day. It is the responsibility of the Construction Manager to communicate specific dates for these milestones:

1. Lighting fixture and controls installation (notify upon completion).
2. Dedicated outdoor air unit (DOAS) with DX cooling and natural gas heating (notify upon scheduling and completion)
3. Variable refrigerant heat-pump system components, evaporator, condenser, supply and exhaust air fan systems and HVAC controls installation (notify upon scheduling and completion).
4. Domestic hot water boiler and respective pipes and pumps (notify upon scheduling and completion)
5. Cabinet unit heaters and baseboard heaters (notify upon scheduling and completion)
6. Air ductwork and distribution equipment such as fans, terminal units, dampers, heating and cooling coils (notify upon completion).
7. HVAC system and controls start-up (notify upon scheduling).
8. Window installation (notify upon scheduling).
9. Roof insulation installation (notify upon scheduling).
10. Building wall insulation installation (notify upon scheduling).
3.2 POST-INSTALLATION INSPECTIONS

A. Lighting systems
   1. Lighting fixture styles, counts and controls will be verified.

B. HVAC systems
   1. Exhaust and supply air systems styles, counts, controls and locations will be verified.
   2. DOAS units, hot water boiler, unit & baseboard heaters, ductwork, terminal units, exhaust and supply fan system ratings, makes, models, efficiencies and component locations will be verified.
   3. HVAC thermostats and controls styles, counts, controls and locations will be verified.
   4. Hot water pipes and insulation – All hot water pipes and tanks will be inspected to ensure that they are insulated to the guideline for pipe insulation as specified in the design documents.

C. Building envelope and insulation
   1. Wall and roof insulation styles, thickness, rated R-value and installation will be verified to ensure they meet the design document specifications.
   2. Windows styles, rated SHGC and U values and installation will be verified to ensure they meet the design document specifications.

3.3 FUNCTIONAL TESTING

A. General
   1. This section contains a general list of items that may be tested and observed during the functional testing phase of the commissioning process. Actual testing may vary based on changes to the construction documents or instructions from the building owner.
   2. The sequence of operation, from the design documents, will be used to test functionality of all applicable equipment.

B. Lighting
   1. Occupancy Scheduling – The lights should turn off when the building is unoccupied, either from occupancy sensors or time clocks. This function will be tested.
   2. Lighting Controls – If photo sensor controls are installed, the artificial lighting should turn off or dim when adequate daylight is available. This functionality will be tested.
   3. BAS Control – If the construction documents imply that lighting fixtures will be controlled through the BAS, this functionality will be tested.
C. HVAC

1. Dedicated outdoor air unit (DOAS) – This unit, which will provide room-neutral ventilation to the building space, will be tested to ensure that it is functioning properly.
   a. On and Off – The system will be tested to ensure that it turns on when space is scheduled occupied and turns off when space is scheduled unoccupied.
   b. Heating and Cooling Modes - The ability for the system to provide heating or cooling depending on specified temperature set-points will be tested.
   c. Energy Recovery – The ability of the energy recovery heat exchanger will be tested to ensure it cycles on when advantageous and cycles off when not required, if applicable to the model. The heat exchanger will also be tested to ensure it sufficiently transfers heat between exhaust and make-up air streams.
   d. Economizer Controls – If applicable to installed model, unit will tested to ensure appropriate economizer technologies are installed and all sequence of operations are followed based on set-points.

2. Variable Refrigerant Heat-pump System – This system which will provide both heating and cooling to the building space will be tested to ensure that it is functioning properly.
   a. Centralized Control – The system will be tested to ensure that the facility’s BAS reads and controls all features available of each individual terminal unit and condensing unit.
   b. Individual Wall-Mounted Controls – Individual wall-mounted controls will be tested to ensure functionality according to the design documents and owner’s “lock-out” requirements.
   c. System Modes – The systems will be tested to ensure that fan, on/off, heating, cooling, ventilation, and other applicable modes are all functional.
   d. Outdoor Condensers – The condensers will be observed to ensure proper equipment staging and usage of variable speed fans or multi-stage fans.

3. Exhaust Fans - Exhaust fans will be inspected to ensure that fans turn on and off or vary their speed according to the control logic, which may include thermostats, occupancy sensors, timing, or equipment tie-in through the BAS.

4. Cabinet Unit Heaters and Baseboard Heaters – All such equipment will be tested to ensure proper tie-in with specified thermostatic or other controls and operational functionality.

5. Thermostats – The system thermostats will be inspected to ensure that they have all specified functionalities and properly control the HVAC systems based on their programmed settings.

6. Ductwork, Grills, Diffusers, and Refrigerant Piping
   a. All equipment installation and locations will be observed to ensure they match indicated design document placement
   b. Duct and pipe insulation will be checked to ensure insulation values meet design documents and is fully installed
   c. Duct sealing will be checked for completeness
   d. Discharge and return grills will be observed to ensure no obstructions
e. Accessibility to dampers and important ductwork components will be observed

D. Envelope and insulation
1. Doors, Windows and Walls – The doors windows and walls will be inspected to ensure they are properly installed and sealed as to minimize air leakage from the building.

E. Building Automation System (BAS)
1. The BAS will be tested to ensure appropriate tie-in, interactivity, control and graphical representation of all intended sensors and equipment.
2. If applicable, the BAS will be tested to ensure capability to trend and record specified data points.

F. Plumbing
1. Domestic hot water (DHW) boiler – DHW boiler system will be inspected to ensure the boiler operates in an efficient control mode and turns on and off or modulates properly based on the hot water needs of the building. Additionally, return water temperature will be recorded to ensure that the boiler operates at the designed efficiency level.
2. DHW pumps – If applicable, system pumps will be inspected to ensure that pumps turn on and off or vary their speed according to the control logic.

3.4 REPORTING AND DOCUMENTATION

A. Findings of the inspections, functional testing and system performance evaluations will be documented and reported to the building owner, construction manager and project manager. Any repairs or changes to building construction, equipment or controls will be communicated promptly through memorandums after site visits. Final findings will be documented in a report for the building owner.

3.5 ACCEPTANCE

A. Systems will be deemed accepted when they have met the intent of the construction documents and the owner is satisfied.

3.6 SUBMITTALS

A. General – The commissioning team does not need to approve every submittal that will be approved by the design team. The following list of submittals must be reviewed by the commissioning team prior to installation. The commissioning team, as an owner’s representative, retains the right to reject or question submittals that do not meet the construction documents or its intent.
B. Lighting
1. Lighting controls – cut sheets for occupancy sensors, photo sensors and central controls
2. Lighting fixtures – cut sheets of make, model, lamp style, lamp wattage, fixture input wattage, and ballast factor.
3. Controls sequence

C. HVAC
1. Primary equipment cut sheets
2. Make, model, appropriate full load and part load efficiency ratings such as EER, IEER
3. Full sequence of operations
4. Available performance data
5. Operations and Maintenance information

D. Building Envelope Insulation
1. Cut sheets with appropriate properties such as U-value, thickness, and installation requirements
2. Available performance data
3. Maintenance information

E. Fenestration
1. Cut sheets with appropriate properties such as glazing center of glass U-value, assembly U-value, SHGC or SC, emissivity requirements, and installation requirements
2. Available performance data
3. Maintenance information

3.7 TRAINING
A. Training shall include:
1. Use of printed operation manuals,
2. Review of procedures for equipment start-up and shutdown,
3. Operation in all modes,
4. Seasonal changeovers,
5. Safe and proper operation, and

B. Training is the responsibility of the contractors for the following equipment
1. Lighting systems
2. Building Automation System (BAS)
3. Dedicated outdoor air unit (DOAS)
4. Variable Refrigerant Flow (VRF) heat-pump system
5. Packed zone HVAC equipment (unit heaters, split systems, etc.)
6. Domestic hot water (DHW) Heater
7. Zone sensors and controls for HVAC and lighting
8. Electric distribution systems
9. Security/alarm systems
10. Fire protection/alarm systems

C. Additional training and documentation for energy-efficient operation of the building systems and equipment will be provided by the CxA.

3.8 OPERATION AND MAINTENANCE (O&M) MANUALS

A. Contractors shall provide draft copies of O&M manuals to the CxA prior to completion of equipment installation, and at least 30 days prior to demonstration and training. Architect and Commissioning Agent will comment on whether general scope and content of manual are acceptable.

B. Contractors shall submit final copies of each O&M manual prior to requesting inspection for completion and at least 15 days prior to demonstration and training.

C. O&M manuals will be reviewed by the CxA and returned to the Contractor. Contractor is responsible to provide corrected O&M manuals within 15 days of receipt of Architects and Commissioning Agent’s comments.

END OF SECTION