

PROJECT MANUAL



SAVANNAH CHATHAM COUNTY PUBLIC SCHOOL SYSTEM C24-01 ATHLETIC FIELDS & FIELDHOUSE

100 PRISCILLA D. THOMAS WAY
GARDEN CITY, GEORGIA 31408

RFP SET, VOLUME 1
MAY 12, 2023

ARCHITECT



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LS3P COMMISSION NUMBER: 5201-192070

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DIVISIONS 00 - 10

SECTION 00 01 10

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 SANITARY SEWER STRUCTURES 0

DOCUMENT 00 01 07 - SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:

1. LS3P Associates Ltd..
2. Neil Dawson, AIA
3. Responsible for Divisions 01-49 Sections except where indicated as prepared by other design professionals of record.



4.

B. Civil Engineer:

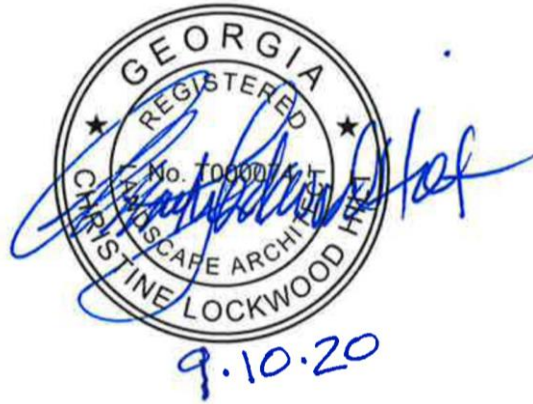
1. Moffatt & Nichol.
2. Craig R. Zuck, PE
3. Responsible for Sections 01 33 00.13, 01 45 00, 01 45 23, 02 41 00, 03 30 00.13, 03 41 00, 31 00 00, 31 10 00, 31 25 00GA, 31 37 00, 32 11 23, 32 12 16GA, 32 17 23, 32 31 13 and Division 33.



4.

C. Landscape Architect:

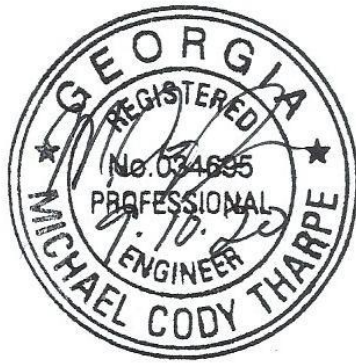
1. CLH Design, P.A.
2. Christine Lockwood Hilt, PLA
3. Responsible for Sections 32 84 00 and 32 90 00.



4.

D. Structural Engineer:

1. Tharpe Engineering Group.
2. M. Cody Tharpe, PE
3. Responsible for Sections 03 20 00, 03 30 00, 03 41 13, 03 52 16, 04 22 00, 05 12 00, 05 21 00, 05 31 00, 05 40 00, 05 44 00, and 31 20 00.



4.

E. Fire-Protection Engineer:

1. Dulohery Weeks Engineers.
2. Brandon M. Webster, PE
3. Responsible for Division 21.



4.

F. Plumbing Engineer:

1. Duloherly Weeks Engineers.
2. Brandon M. Webster, PE
3. Responsible for Division 22.



4.

G. Mechanical Engineer:

1. Duloherly Weeks Engineers.
2. Robert E. Lafond, PE
3. Responsible for Division 23.



4.

H. Electrical Engineer:

1. Duloherly Weeks Engineers
2. Wesley O. Wommack, PE
3. Responsible for Divisions 26 and 27.



4.

I. Food Service Design:

1. Camacho Foodservice Design and Consulting
2. Glenn Harshman
3. Responsible for Sections 11 40 00 and 11 41 00.

J. Sports Design:

1. CHA Consulting Inc.
2. Patrick N. Graham, PE
3. Responsible for Sections 11 52 13, 11 68 33, 11 68 33.43, 11 68 43, 26 00 01, 32 12 16.36, 32 12 16.37, 32 18 13, 32 18 14, 32 18 15, 32 18 23.20, 32 18 23.38-41, 32 91 10 and 32 92 26.



- 4.
5. Karl Leabo, AIA
6. Responsible for Sections 13 34 16.13 and 13 34 16.63.



7.

K. Integrated Audio/Video Systems Design:

1. Stage Front
2. Adam Durden
3. Responsible for Section 27 41 00.

END OF DOCUMENT 00 01 07

01 11 16 – BID C21-01 SOLICITATION DOCUMENT shall be issued by the Owner.

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DOCUMENT 00 31 32 - GEOTECHNICAL DATA

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. This Document and its attachments are not part of the Contract Documents.
- B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warrant the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.
- C. A geotechnical investigation report for Project, prepared by Terracon Consultants, Inc., dated April 14, 2020, is available for viewing as appended to this Document.
 - 1. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.
 - 2. Any party using information described in the geotechnical report shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.

END OF DOCUMENT 00 31 32



Geotechnical Engineering Report_REV03

**Groves K-12 School
Garden City, Chatham County, Georgia**

November 5, 2020
Terracon Project No. ES205016

Prepared for:
Savannah - Chatham County Public School System
Savannah, Georgia

Prepared by:
Terracon Consultants, Inc.
Savannah, Georgia



November 5, 2020

Savannah - Chatham County Public School System
208 Bull Street, Room 316
Savannah, Georgia 31401



Attn: Mr. Lorne George
P: (912) 395 1032
E: Lorne.George2@sccpss.com

Re: **Geotechnical Engineering Report_REV03**
Groves K-12 School
Garden City, Chatham County, Georgia
Terracon Project No. ES205016

Dear Mr. George:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. PES205016 dated February 12, 2020, and three change orders dated February 12, 2020, February 28, 2020, and April 20, 2020. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and floor slabs for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

A handwritten signature in black ink that reads "Yan Jiang".

Yan Jiang, Ph.D., P.E.
Project Geotechnical Engineer

A handwritten signature in black ink that reads "Guoming Lin".

Guoming Lin, Ph.D., P.E., D.GE
Senior Consultant

REPORT TOPICS

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Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the **GeoReport** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES
SITE LOCATION AND EXPLORATION PLANS
EXPLORATION RESULTS
SUPPORTING INFORMATION

Note: Refer to each individual Attachment for a listing of contents.

REPORT SUMMARY

| Topic | Overview Statement ¹ |
|--------------------------------------|---|
| Project Description | <ul style="list-style-type: none"> - Construction of the main school building with associated parking spaces and driveways. The plan also includes a small building and grandstand. - The finished floor for the main building will be about three feet above the existing grade. The finished floor for the small building will be close to the existing grade. - Expected traffic for pavement areas not provided. Pavement recommendation based on our experience with similar buildings in this area. |
| Geotechnical Characterization | <ul style="list-style-type: none"> - Approximately 2 to 36 inches of topsoil. The thickness of topsoil will vary, depending upon the near-surface soil disturbance during the site preparation. Please refer to the Geotechnical Characterization section. - The site has a layer of soft soils below the topsoil, which can cause unstable subgrade and potential foundation settlements, especially during the wet season. - Groundwater was encountered at approximately 2.5 and 7 feet BGS at the time of our field exploration. |
| Earthwork | <ul style="list-style-type: none"> - Install a site drainage system. - Strip/grub topsoil. - Level, densify, and proofroll subgrade during subgrade preparation. If detected any soft/weak areas, repair subgrade by undercut and backfill. - The proofroll program should be specially set up to detect weak soils for targeted undercuts under footings to control foundation settlements. - For details, please refer to the Earthwork section. |
| Spread Footing Foundations | <p>The soils are marginally adequate for shallow foundations. Spread footing foundations may be used after the subgrade has been improved with undercut and backfill with No. 57 stone. A two-foot undercut and #57 stone backfill should be planned for all footings larger than five feet or a design load greater than 50 kips. Due to soft soils at shallow depths, a proofroll is required to detect unstable subgrade prior to fill placement. The undercut should be directed to target footing locations. The actual extent and depth of undercut should be decided in the field based on the subgrade conditions during construction.</p> <p>Allowable bearing pressure after subgrade improvement = 2,000 psf Expected settlements: < 1-inch total, < 1/2-inch differential</p> |
| Pavements | <p>The traffic loading information was not available. Based on our experience with similar buildings in this area, we recommend the following pavements after the subgrade has been prepared, as noted in the Earthwork section.</p> <p><u>Concrete:</u></p> <ul style="list-style-type: none"> ■ 5" PCC over 4" graded aggregate base in Light Duty areas ■ 7" PCC over 4" graded aggregate base in Heavy Duty areas <p><u>Asphalt:</u></p> <ul style="list-style-type: none"> ■ 2" ACC over 7" graded aggregate base in Light Duty areas ■ 3.5" ACC over 8" graded aggregate base in Heavy Duty areas |

Geotechnical Engineering Report_REV03

Groves K-12 School ■ Garden City, Chatham County, Georgia

November 5, 2020 ■ Terracon Project No. ES205016



| | |
|---|--|
| General Comments | This section contains important information about the limitations of this geotechnical engineering report. |
| <ol style="list-style-type: none">1. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes. | |

Geotechnical Engineering Report_REV03
Groves K-12 School
Garden City, Chatham County, Georgia
Terracon Project No. ES205016
November 5, 2020

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering evaluation for the proposed school building to be located at Groves High School in Garden City, Chatham County, Georgia. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions
- Site preparation and earthwork
- Pavement design and construction
- Foundation design and construction
- Floor slab design and construction
- Seismic site classification per IBC

The geotechnical engineering Scope of Services for this project included the advancement of 11 Cone Penetration Test (CPT) soundings to depths ranging from approximately 46 to 53 feet below existing site grades and 11 Hand Auger (HA) borings to approximately 5 feet below existing site grades. The CPT sounding of C7 could not be performed due to highly dense underground utilities.

We also performed 4 pavement corings on Wheathill Road and 9 hand auger borings to 5 feet below the ground surface (BGS) along the proposed access road realignment.

Maps showing the site and boring locations are shown in the **Site Location** and **Exploration Plan** sections, respectively.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

| Item | Description |
|------------------------------|--|
| Parcel Information | The project is located at Groves High School in Garden City, Chatham County, Georgia. Latitude: 32.1072°, Longitude: -81.1561° See Site Location |
| Existing Improvements | School buildings, football fields, and driveways and parking lots. |
| Current Ground Cover | The site for the proposed main building is mostly a football field with grassed cover. |
| Existing Topography | Relatively level. |

PROJECT DESCRIPTION

Our initial understanding of the project was provided in our proposal and was discussed during project planning. **Should any of the below information or assumptions be inconsistent with the planned construction, Terracon should be informed so that modifications to this report can be made as necessary.** Our final understanding of the project conditions is as follows:

| Item | Description |
|---------------------------------|--|
| Information Provided | We received a site plan and building plan from Mr. Lorne George with the school board in an email on February 12, 2020. We received a topographic plan and drainage plan from Mr. Craig Zuck with Moffat & Nichol in an email on April 6, 2020. We also received load information from Ms. April Mundy with LS3P in emails on April 6, 2020. |
| Project Description | Construction of a three-story main building and a two-story small building for K-12 School. A grandstand will also be constructed. |
| Proposed Structure | The project includes a grandstand and two school buildings with associated parking spaces and driveways. The buildings will be slab-on-grade (non-basement). |
| Finished Floor Elevation | The finished floor elevations for the main building and small buildings are 23 and 24 ft, respectively. |

| Item | Description |
|-----------------------------|--|
| <p>Maximum Loads</p> | <p>The loading information is provided by the structural engineer in an email dated April 6, 2020:</p> <ul style="list-style-type: none"> - Max. column loads (main building): 200 kips (dead load) + 50 kips (live load) - Max. wall loads (main building): 10 klf (dead load) + 3 klf (live load) - Assumed slab load (main building): 300 psf - Grandstand column loads: 50 kips (dead load + live load) - Finished grade for the main building will be about three feet above the existing grade. Finished grade for the small building will be close to the existing grade. <p>Note: If the structural loading is significantly different from those used in our evaluation, Terracon should be retained for further analyses to determine the type of foundation system needed to support the structure.</p> |
| <p>Pavements</p> | <p>The light-duty section is constructed for the areas that receive only car traffic. The heavy-duty section assumes car traffic and 50 to 100 school buses and delivery vehicles per day and 5 trash removal trucks per week. The pavement design period is 20 years.</p> |

GEOTECHNICAL CHARACTERIZATION

Subsurface Profile

We have developed a general characterization of the subsurface soil and groundwater conditions based upon our review of the data and our understanding of the geologic setting and planned construction. The following table provides our geotechnical characterization.

The geotechnical characterization forms the basis of our geotechnical calculations and evaluation of site preparation, foundation options and pavement options. As noted in **General Comments**, the characterization is based upon widely spaced exploration points across the site, and variations are likely.

CPT Soundings of C1 to C6

| Stratum | Approximate Depth to Bottom of Stratum (feet) Below Ground Surface | Material Characterization Based on CPT Soundings and Hand Auger Borings | Consistency/ Relative Density |
|-----------|--|---|-------------------------------|
| Stratum 1 | 0.2 to 3 ¹ | Silty sands with grass roots with gravel in HA9 | n/a |
| Stratum 2 | 13 to 15 ² | Silty sands | Loose to medium dense |

| Stratum | Approximate Depth to Bottom of Stratum (feet) Below Ground Surface | Material Characterization Based on CPT Soundings and Hand Auger Borings | Consistency/ Relative Density |
|------------------------------|--|---|-------------------------------|
| Stratum 3 (varying soils) | 22 | Silty sands | Loose to medium dense |
| | | Sandy clays | Medium stiff |
| Stratum 4 (varying soils) | 31 | Sandy clays | Medium stiff |
| | | Silty sands | Medium dense |
| Stratum 5 | 40 to 43 | Sandy clays | Medium stiff |
| Stratum 6 | 53, end of exploration | Silty sands | Medium dense to dense |

Notes:

1. The depth/thickness of topsoil will vary, depending upon the near-surface soil disturbance during the site preparation.
2. Soft clays were encountered at the CPT soundings of C2, C3, C5, and C6.

CPT Soundings of C8 and C9

| Stratum | Approximate Depth to Bottom of Stratum (feet) Below Ground Surface | Material Characterization Based on CPT Soundings and Hand Auger Borings | Consistency/ Relative Density |
|-----------|--|---|-------------------------------|
| Stratum 1 | 0.2 to 3 ¹ | Silty sands with grassroots with gravel in HA9 | n/a |
| Stratum 2 | 2 to 3 | Silty sands | Loose to medium dense |
| Stratum 3 | 35 to 38 | Clays with interbedded thin sandy layers at various depths | Soft to stiff |
| Stratum 4 | 47 to 49 | Sandy clays | Hard |
| Stratum 5 | 53, end of the exploration | Silty/clayey sands | Medium dense to very dense |

Notes:

1. The depth/thickness of topsoil will vary, depending upon the near-surface soil disturbance during the site preparation.

CPT Soundings of C10 and C11

| Stratum | Approximate Depth to Bottom of Stratum (feet) Below Ground Surface | Material Characterization Based on CPT Soundings and Hand Auger Borings | Consistency/ Relative Density |
|-----------|--|---|-------------------------------|
| Stratum 1 | 0.2 to 3 ¹ | Silty sands with grass roots with gravel in HA9 | n/a |

| Stratum | Approximate Depth to Bottom of Stratum (feet) Below Ground Surface | Material Characterization Based on CPT Soundings and Hand Auger Borings | Consistency/ Relative Density |
|---------------------------|--|---|-------------------------------|
| Stratum 2 | 1 to 2 | Silty sands | Loose to medium dense |
| Stratum 3 (varying soils) | 9 | Silty sands | Medium dense |
| | | Sandy clays | Soft to medium stiff |
| Stratum 4 (varying soils) | 15 | Sandy clays | Medium stiff to stiff |
| | | Silty sands | Loose to medium dense |
| Stratum 5 | 27 | Silty sands | Loose to medium dense |
| Stratum 6 | 27 | Silty sands | Loose to medium dense |
| Stratum 7 | 53, end of exploration | Silty/clayey sands | Medium dense to very dense |

Notes:

1. The depth/thickness of topsoil will vary, depending upon the near-surface soil disturbance during the site preparation.

Conditions encountered at each exploration location are indicated on the individual logs shown in the **Exploration Results** section and are attached to this report. Stratification boundaries on the CPT/boring logs represent the approximate location of changes in native soil types; in situ, the transition between materials may be gradual.

Groundwater Conditions

The boreholes were observed while drilling and after completion for the presence and level of groundwater. The water levels observed in the boreholes can be found on the logs in the **Exploration Results**, and are summarized below.

We used a Slope Indicator® water level meter upon the completion of the CPT sounding tests to obtain the groundwater depths. The groundwater depths in the hand auger borings were determined based on the depths where saturated soils were encountered at the time of our field exploration.

| CPT Sounding / Hand Auger Boring Number | Approximate Depth to Groundwater Below Ground Surface (feet) | Remark | |
|---|--|-----------------------------------|--------------------|
| C2 | 5.5 | GWT at the completion of sounding | |
| C3 | 5.5 | | |
| C5 | 3.5 | | |
| C6 | 4.0 | | |
| C8 | 8.5 | | |
| C9 | 7.0 | | |
| C10 | 4.1 | | |
| HA1 | 5.0 | | GWT while drilling |
| HA2 | 2.5 | | |
| HA3 | 2.5 | | |
| HA4 | 3.0 | | |
| HA5 | 3.0 | | |
| HA6 | 5.5 | | |
| HA7 | 3.0 | | |
| HA8 | 4.0 | | |
| HA9 | 4.0 | | |
| HA10 | 4.0 | | |

Groundwater level fluctuations occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the borings were performed. Furthermore, the near surface clayey soils have poor drainage characteristics and are prone to peached water table conditions.

Therefore, groundwater levels during construction or at other times in the life of the structure may be higher or lower than the levels indicated on the logs. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

Field Infiltration Test

Three borehole infiltration tests (constant head test) were performed at approximately 1 foot above the groundwater table during the time of field exploration. The tests were performed at the three locations, as shown in the **Exploration Plan** section.

In the tests, a 4-inch PVC casing will be provided down to the bottom of the hole. The casing will be then filled with water to maintain the water level constant is the measure of the volume of water that infiltrates the soil. The volume infiltrated during timed intervals is converted to an incremental infiltration velocity, usually as inches per hour (in/hr.) and plotted versus elapsed time.

Based on the findings encountered in the associated hand auger borings, the existing soils encountered sandy clays at the locations of IR2 and IR3. The measured infiltration rates are close to zero at the locations of IR2 and IR3. Generally, clayey soils have poor infiltration rates. The table below represents our findings during our field exploration procedures.

| Location | Test Method | Test Depth (in., BGS) | Soil Types | Infiltration Rate (inches/hr) |
|----------|---------------|-----------------------|------------|-------------------------------|
| IR1 | Constant Head | 20 | Silty sand | 0.72 |
| IR2 | Constant Head | 29 | Sandy clay | 0 |
| IR3 | Constant Head | 30 | Sandy clay | 0 |

During this procedure, hand auger borings were drilled to 5 feet below the ground surface. Detailed infiltrometer test results are presented in the table and graph in the **Exploration Results** of this report.

RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

The following evaluation and recommendations are based upon our understanding of the proposed construction and the results from our field exploration. If the above-described project conditions are incorrect or changed after this report, or subsurface conditions encountered during construction are significantly different from those reported, Terracon should be notified, and these recommendations must be re-evaluated to make appropriate revisions.

Geotechnical Considerations

The subsurface conditions at this site are adaptable for the proposed construction. The generalized soil profile is presented in the **Geotechnical Characterization** section.

Based on the information provided, we understand the proposed school building will have the maximum column load of 200 kips (dead loads) as well as a wall load of 10 kips/ft (dead loads). We assumed the slab load of 300 psf.

If heavier structural loads are required than those discussed above, or if the site will receive significantly more fill, Terracon should be retained to perform the additional evaluation.

We performed the settlement analyses at each sounding location using the soil parameters derived from the CPT soundings and the structural loads discussed above. Based on the results of our settlement analyses, the settlements were estimated at less than 1.0 inch for the slab load of 300 psf. The settlements were estimated between 0.8 inch and 2.0 inches for the column load of 200 kips, wall load of 10 kips/ft. A majority of the settlement is caused by the soft clays in the

upper 7 to 8 feet. As such, we view the soils as marginally adequate. To save the cost of piling or a major ground improvement program like geopiers or rigid inclusions, we recommend the building can be supported on shallow foundations after the subgrade soils are improved using targeted undercut and backfill with No. 57 stone. Due to soft soils at shallow depths, a proofroll is required to detect unstable subgrade after topsoil stripping and before fill placement. The proofroll should be performed with footing lines marked on the ground. The unstable subgrade should be improved with undercut and backfill with #57 stone under the footings and structural fill under slabs. For planning and budget purpose, we recommend two feet of undercut and #57 stone under all footings larger than five feet or design loads greater than 50 kips. The contract should include a unit price for stone and structural fill for add and deduct. The actual depth of undercut and fill placement should be decided in the field based on the subgrade conditions during construction added with hand auger borings as needed.

It should be noted that the site has a layer of soft clays at shallow depths, as shown in the CPT soundings logs of C2, C3, C5, C6, C8 to C10. The soft clays are moisture sensitive. After the removal of the surface crust or topsoil during site work, the soft clays may be exposed or close to the top of the subgrade. The subgrade is marginally stable and may become unstable after rains or disturbed by the construction traffic. A positive site drainage plan is critical to site stability. The site grading including topsoil stripping and filling should be sequenced based on the weather to avoid exposure of unprotected subgrade.

Demolition of Existing Building Foundations

We understand the existing buildings at the site will be demolished/removed to accommodate the proposed construction. The demolition/removal of the existing building slab may leave old foundations and utilities at the site. These old foundations and utilities should be removed from the building areas. Any voids from the removal should be repaired by backfilling with compacted fill or #57 stone. The aggregate base and concrete may be stockpiled for reuse as engineering fill, if desired. The crushed materials should be tested for gradation and impurity contents before its use.

EARTHWORK

We anticipate a relatively challenging site work condition due to the soft clays at shallow depth after topsoil stripping and grubbing. The clays have poor drainage characteristics and can become unstable. Site preparation should include installation of a site drainage system, topsoil stripping and grubbing, subgrade preparation, densification, and proofrolling. **Please bear in mind, due to the uneven ground surface of the site, the volume of topsoil and organics may be significantly greater than the area times the topsoil/organics thickness indicated in the boring logs.** Rutting of the subgrade can also cause the mixing of topsoil/organics with

underlying soils which will result in additional required topsoil/organics stripping. Deeper undercuts may be needed in some localized areas to remove unsuitable materials.

Site Drainage

An effective drainage system should be installed prior to site preparation and grading activities to intercept surface water and to improve overall shallow drainage. The drainage system may consist of perimeter ditches supplemented with parallel ditches and swales. Pumping equipment should be prepared if the above ditch system cannot effectively drain water away from the site, especially during the rainy season. The site should be graded to shed water and avoid ponding over the subgrade.

Densification and Proofrolling

Prior to fill placement on the subgrade, the proposed building and pavement areas should be densified with a heavy-duty static roller to achieve a uniform subgrade. The subgrade underneath the building and the pavement should be thoroughly proofrolled after the completion of densification. Proofrolling will help detect any isolated soft or loose areas that "pump", deflect or rut excessively, and also densify the near-surface soils for floor slab support.

A loaded tandem axle dump truck, capable of transferring a load in excess of 20 tons, should be utilized for this operation. Proofrolling should be performed under the Geotechnical Engineer's observation. Areas where pumping, excessive deflection, or rutting is observed after successive passes of the proofrolling equipment should be undercut, backfilled, and then properly compacted. It is anticipated that some amount of subgrade undercutting may be required under the footings during subgrade preparation.

Subgrade densification and proofrolling is a standard procedure in site preparation. But we recommend the following special provisions to address the marginal adequate subgrade for the use of shallow foundations:

1. The contractor should notify the program manager at least two days in advance of the topsoil stripping and subgrade evaluation to allow the program manager to coordinate the testing and inspection;
2. The work of topsoil stripping, subgrade evaluation, and repair and fill placement should be scheduled and sequenced based on the weather conditions to avoid the exposure unprotected subgrade to rains;
3. After topsoil stripping, the contractor should mark the building corners and column footings prior to proofrolling. Based on the subgrade conditions during proofrolling, the testing firm should perform additional hand auger borings at the footing locations to help direct the

subgrade repair. The actual depth of undercut should be decided in the field based on the subgrade conditions and footing depths;

- The undercut should be backfilled with No. 57 stones under footings and structural fill under slabs and pavements.

Fill Material Types

Fill required to achieve design grade should be classified as structural fill. Earthen materials used for structural should meet the following material property requirements:

| Soil Type ¹ | USCS Classification | Acceptable Parameters (for Structural Fill) |
|------------------------|-----------------------------------|---|
| Granular | GW, GP, GM, GC, SW, SP, SM, SC | Less than 25% Passing No. 200 sieve |

- Structural should consist of approved materials free of organic matter and debris. A sample of each material type should be submitted to the Geotechnical Engineer for evaluation prior to use on this site.

Based on the findings from our hand auger borings, the subject site consists of soils varying from silty sands (SM) to clayey sands (SC) to sandy clays (CL) in the upper 5 feet BGS. The silty sands (SM) are generally considered suitable for structural fill, provided that the soils are free of roots, organics, or other foreign materials. Clayey sands (SC) may be considered marginally suitable; and the sandy clays (CL) are deemed unsuitable for structural fill.

We define marginally suitable as the soils that may require extra effort to adjust moisture before they can be compacted. The amount of effort required will be highly dependent on the season and the weather conditions during construction. We recommend Terracon be retained during construction to determine the suitability of the onsite soil as fill material.

Fill Compaction Requirements

Structural fills should meet the following compaction requirements.

| Item | Structural Fill |
|---|---|
| Maximum Lift Thickness | 8 to 10 inches or less in loose thickness when heavy, self-propelled compaction equipment is used. 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is used. |
| Minimum Compaction Requirements ¹ | 95% of max. below foundations and below finished pavement subgrade. |
| Water Content Range ¹ | -3% to +2% of the optimum moisture content. |

- Maximum density and optimum water content as determined by the modified Proctor test (ASTM D 1557).

Some manipulation of the moisture content (such as wetting, drying) will be required during the filling operations to obtain the required degree of compaction. The manipulation of the moisture content is highly dependent on weather conditions and site drainage conditions. Therefore, the contractor should prepare both dry and wet fill materials to obtain the specified compaction during grading. A sufficient number of density tests should be performed to confirm the required compaction of the fill material.

Earthwork Construction Considerations

Shallow excavations, for the proposed structure, are anticipated to be accomplished with conventional construction equipment. Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of floor slabs. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over, or adjacent to, construction areas should be removed.

If the subgrade saturates or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted, prior to floor slab construction. The groundwater table could affect over-excavation efforts, especially for over-excavation and replacement of lower strength soils. A temporary dewatering system consisting of sumps with pumps could be necessary to achieve the recommended depth of over-excavation.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local, and/or state regulations.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety, or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be monitored under the direction of the Geotechnical Engineer. Monitoring should include documentation of adequate removal of vegetation and topsoil, proofrolling, and mitigation of areas delineated by the proofroll to require mitigation.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency provided by the project plan and specifications.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. If unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer’s evaluation of subsurface conditions, including assessing variations and associated design changes.

SPREAD FOOTING FOUNDATIONS

After the subgrade has been improved by undercut and backfill with No.57 stones, the proposed building can be supported on a spread footing foundation system, provided that the proposed structure will not exceed the loads as provided in the **Project Description** section and the structure has criteria of the allowable settlement of 1 inch or greater. The following sections present design recommendations and construction considerations for the shallow foundations for the proposed building and related structural elements.

Design Parameters

| Description | Column | Wall |
|---|-------------------------|------------------------|
| Net allowable bearing pressure¹ | 2000 psf | 2000 psf |
| Minimum dimensions | 24 inches | 12 inches |
| Minimum embedment below finished grade | 18 inches | 12 inches |
| Approximate total settlement² | <1 inch | <1 inch |
| Estimated differential settlement | <1 inch between columns | <1/2 inch over 40 feet |
| Ultimate Coefficient of sliding friction³ | 0.32 | |

1. The recommended net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. It assumes any unsuitable fill or soft soils, if encountered, will be replaced with compacted No.57 stones.
2. The foundation settlement will depend upon the variations within the subsurface soil profile, the structural loading conditions, the embedment depth of the footings, the thickness of compacted No.57 stones, and the quality of the earthwork operations. Footings should be proportioned to reduce differential settlements. Proportioning on the basis of equal total settlement is recommended; however, proportioning to relative constant dead-load pressure will also reduce differential settlement between adjacent footings.
3. Sliding friction along the base of the footing will not develop where net uplift conditions exist.

The design bearing pressure may be increased by one-third when considering the total load that includes the wind or seismic conditions. The weight of the foundation concrete below grade may be neglected in dead load computations.

Footings, foundations, and masonry walls should be reinforced as necessary to reduce the potential for the distress caused by the differential foundation movement. The use of joints at openings or other discontinuities in masonry walls is recommended.

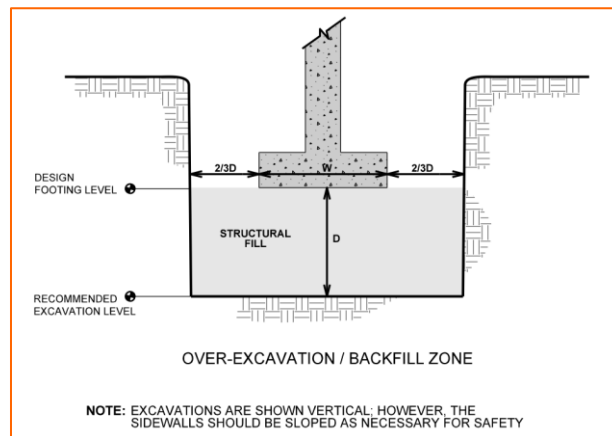
Foundation excavations should be observed by Terracon. If the soil conditions encountered differ significantly from those presented in this report, Terracon should be contacted to provide additional evaluation and supplemental recommendations.

Foundation Construction Considerations

The bottom of all foundation excavations should be free of water and loose soil and rock prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance.

Care should be taken to prevent wetting or drying of the bearing materials during construction. Extremely wet or dry material or any loose or disturbed material in the bottom of the footing excavations should be removed before foundation concrete is placed. If the soils at bearing level become excessively dry, disturbed or saturated, the affected soil should be removed prior to placing concrete. A lean concrete mud-mat should be placed over the bearing soils if the excavations must remain open for an extended period of time.

Regarding the construction of footings, we generally recommend No.57 stone be used to support the spread footings. Excavation for No.57 stone placement below footings should be conducted as shown below. It is important that Terracon be retained to observe, test, and evaluate the bearing soil prior to placing reinforcing steel and concrete to determine if additional footing excavation or other subgrade repair is needed for the design loads.



FLOOR SLABS

Floor Slab Design Parameters

| Item | Description |
|--|---|
| Floor slab support | Compacted structural fill/inspected and tested natural ground. ¹ |
| Modulus of subgrade reaction | 120 pounds per square inch per in (psi/in) for point loading conditions. |
| Base course/capillary break² | 4 inches of free draining granular material. |
| Vapor barrier | Project Specific. ³ |
| Structural considerations | Floor slabs should be structurally separated from columns and walls to allow relative movements. ⁴ |

1. Because the existing ground may have been filled or disturbed previously, we recommend the subgrade be inspected and tested with proofrolling after the topsoil is stripped as outlined in the **Earthwork** section.
2. The floor slab design should include a base course comprised of free-draining, compacted, granular material, at least 4 inches thick. The granular subbase may be graded aggregate base (GAB) or sands containing less than 5 percent fines (material passing the #200 sieve). GAB subbase can also help improve the workability of the subgrade especially during rain periods.
3. The use of a vapor retarder should be considered beneath concrete slabs on the grade that will be covered with wood, tile, carpet or other moisture sensitive or impervious coverings, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.
4. Floor slabs should be structurally independent of any building footings or walls to reduce the possibility of floor slab cracking caused by differential movements between the slab and foundation. Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates that any differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks that occur beyond the length of the structural dowels. The structural engineer should account for this potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Floor Slab Construction Considerations

Prior to construction of grade supported slabs, varying levels of remediation may be required to reestablish stable subgrades within slab areas due to construction traffic, rainfall, disturbance, desiccation, etc. As a minimum, the following measures are recommended.

- Interior trench backfill placed beneath slabs should be compacted in accordance with recommendations outlined in the **Earthwork** section..
- All floor slab subgrade areas should be moisture conditioned and properly compacted to the recommendations in this report immediately prior to placement of the stone base and concrete.

ACCESS ROAD

The proposed access road realignment will shift part of Wheathill Road to the south east to make room for the new stadium. The road shift starts Cooper Lane and extends up to SR21. We did four pavement cores and nine hand auger borings for the access road realignment. The locations of the pavement coring and hand auger borings are shown in Exhibit A-2 and the logs of pavement coring and hand auger boring were presented in Exhibit A-7.

The pavement cores shows that the existing pavement has 4 to 4.5 inches of asphalt and 4 to 9 inches of soil cement base. The hand auger borings show the soils in the upper five feet mainly consist of silty sands, clayey sands, and sandy clays. We anticipate the access road will receive car traffic, school buses, delivery vehicles and trash removal trucks. The heavy-duty section should be used for the access road. The pavement recommendations for heavy-duty section are detailed in the **Pavement** Section.

We understand the existing driveway parallel to Wheathill Road and along the school building will be demolished/removed to accommodate the proposed construction. The demolition/removal of the existing driveway may leave old utilities at the site. These old utilities should be removed from the building areas. Any voids from the removal should be repaired by backfilling with compacted fill or #57 stone.

PAVEMENTS

General Pavement Comments

We understand the proposed project will include the existing access road realignment (part of Wheathill Road), paved driveways and parking areas. This section presents thickness recommendations for asphalt concrete (AC) and Portland cement concrete (PCC) pavements and general considerations for the pavement construction. Pavement thickness design is dependent upon:

- The traffic loads including traffic pattern and the service life of the pavement;
- Subgrade conditions including soil strength and drainage characteristics;
- Paving material characteristics;
- Climatic conditions of the region.

Traffic patterns and anticipated loading conditions were not available at the time of this report preparation. However, we anticipate that traffic loads will be produced primarily by automobile traffic, school buses, pickup trucks and a limited number of delivery and trash removal trucks.

Two pavement section alternatives have been provided. The light duty section is for the areas that receive only car traffic. The heavy-duty section assumes car traffic and 50 to 100 school buses and delivery vehicles per day and 5 trash removal trucks per week. If heavier traffic loading is expected, the proposed development should be provided with the information and allowed to review these pavement sections.

A design life of 20 years was assumed to develop the total traffic used in thickness design. However, as typical for pavement, some maintenance repairs are typically required for a period of 7 to 10 years.

Recommended paving material characteristics, taken from the Georgia Department of Transportation’s (GDOT) 2001 edition of Standard Specifications for Construction of Transportation Systems, are included for the asphalt concrete sections.

Asphalt Pavement Design Recommendations

| Material | Minimum Section Thickness (inch) | |
|--|----------------------------------|--------------------|
| | Light Duty Section | Heavy Duty Section |
| Asphalt Surface Course ¹ | 2 | 1½ |
| Asphalt Intermediate Course ¹ | 0 | 2 |
| Aggregate Base Course ¹ | 7 | 8 |
| Total Pavement Section | 9 | 11½ |
| Select fill ² /improved subgrade ³ | 24 | 24 |

1. Asphalt concrete and base course materials should conform to the following GDOT material specifications.
 - Section 815 for Graded Aggregate
 - Section 828 for Hot Mix Asphalt Concrete Mixture. Surface course may use 9.5 mm Superpave for smooth surface in the light-duty section or 12.5 mm Superpave for the heavy-duty section. 19 mm and/or 25 mm Superpave is recommended for the intermediate course.
2. The select fill should be relatively clean sands with percent fines less than 15%. The fill material should be compacted to a minimum of 95% of the soil’s Modified Proctor maximum dry density (ASTM D-1557).
3. If SP or SP-SM or SM soils exist at the proposed subgrade elevation extending to a depth at least 24 inches below the proposed subgrade level, the in-situ soils can replace the select fill and the subgrade should be improved using densification as discussed in the **Earthwork** section.

Notes:

- Proper surface and subgrade drainage system should be installed to avoid saturation of subgrade soils underneath the asphalt pavements. The site drainage should be designed to maintain the groundwater at least 2 feet below the top of the subgrade.
- Some subgrade soil undercutting and backfilling with suitable structural fill will be required if unstable subgrade soils are encountered during subgrade preparation. The use of geogrid (Tensar BX1100 or equivalent) may be necessary to help reduce the depth of undercut to achieve stability if the unstable subgrade soils extend to

greater depths. The need for geogrid and/or the need for undercutting and backfilling should be determined in the field during subgrade preparation.

Concrete Pavement Design Recommendations

| Material | Minimum Section Thickness (inch) | |
|---|----------------------------------|--------------------|
| | Light Duty Section | Heavy Duty Section |
| Concrete ¹ | 5 | 7 |
| Graded aggregate base ² | 4 | 4 |
| Select fill ³ / improved subgrade ⁴ | 24 | 24 |

1. The concrete should be air entrained and have a minimum compressive strength of 4,000 psi after 28 days of lab curing per ASTM C-31.
2. Graded aggregate base should conform to the GDOT material specification Section 815.
3. The select fill should be relatively clean sands with percent fines less than 15%. The fill material should be compacted to a minimum of 95% of the soil's Modified Proctor maximum dry density (ASTM D-1557).
4. If SP or SP-SM or SM soils exist at the proposed subgrade elevation extending to a depth at least 24 inches below the proposed subgrade level, the in-situ soils can replace the select fill and the subgrade should be improved using densification as discussed in the **Earthwork** section.

Notes:

- Concrete joints should be sealed properly to avoid ingress of surface water into the subgrade soils. We recommend a maximum joint spacing of 12 feet. A jointing plan should be developed to avoid irregular shaped panels to control shrinkage cracking. Proper surface and subgrade drainage system should be installed to avoid saturation of subgrade soils underneath the concrete pavements. The site drainage should be designed to maintain the groundwater at least 2 feet below the top of the subgrade.
- Some subgrade soil undercutting and backfilling with suitable structural fill will be required if unstable subgrade soils are encountered during subgrade preparation. The use of geogrid (Tensar BX1100 or equivalent) may be necessary to help reduce the depth of undercut to achieve stability if the unstable subgrade soils extend to greater depths. The need for geogrid and/or the need for undercutting and backfilling should be determined in the field during subgrade preparation.

For the pavement support, the subgrade conditions can often be the overriding factor in pavement performance. The subgrade conditions will depend on the in-situ soils at the subgrade level, characteristics of fill material for the subgrade, as well as site preparation procedures.

We understand that the finished subgrade in most area of the site will be near the existing ground surface. Beneath the top soil layer, our hand auger borings encountered soils varying from fine silty to clayey sands to sandy clays. The near surface soils contain silty sand, clayey sands and clays. Silty sands have good drainage characteristics and are deemed suitable for subgrade support while clayey sands and clays have poor drainage characteristics and are deemed unsuitable for subgrade support. We recommend the upper two feet of the subgrade be relatively clean sands with percent

finer than 15 percent. A California Bearing Ratio (CBR) value of 8 has been estimated based on the in-situ soils at the site and typical imported fills available in this area.

The above rigid and flexible pavement sections represent the minimum design thicknesses and, as such, periodic maintenance should be anticipated. Prior to the placement of the crushed stones, the pavement subgrade should be thoroughly proofrolled.

Pavement Construction Considerations

Pavement subgrades prepared early in the project should be carefully evaluated as the time for pavement construction approaches. We recommend the pavement areas be rough graded and then thoroughly proofrolled with a loaded tandem-axle dump truck.

Particular attention should be paid to the high traffic areas that were rutted and disturbed, and to the areas where backfilled trenches are located. Areas where unsuitable conditions are located should be repaired by removing and replacing the materials with properly compacted fill. After proofrolling and repairing subgrade deficiencies, the entire subgrade should be scarified to a depth of 12 inches, and uniformly compacted to at least 95% of the materials' modified Proctor maximum dry density.

Pavement and Subgrade Drainage

Poor subgrade drainage is the most common cause of pavement failure. Pavement should be sloped to provide rapid drainage of surface water. Water should not be allowed to pond on or adjacent to the pavement which would saturate the subgrade soils and weaken the subgrade support. We recommend the site drainage be designed to maintain the groundwater at least two (2) feet below the top of the subgrade.

Pavement subgrade drainage should be installed surrounding the areas anticipated for frequent wetting or having poor natural drainage, such as landscaped islands, along curbs and gutters and around drainage structures. All landscaped areas in or adjacent to pavements should be sealed to reduce the moisture migration to subgrade soils. Subgrade drains should be installed with the pipe bottom at least two (2) feet below the top of the select fill. The civil engineer should decide the placement of the subgrade drains to avoid the saturation of pavement subgrade.

Pavement Maintenance

The performance of pavements will require regular maintenance. One key component of the maintenance is to minimize infiltration of water into the pavement base and subgrade. Preventive maintenance should include crack and joint sealing and patching as well as overall surface sealing and overlay. Additional engineering observation and evaluation is recommended prior to any major maintenance.

SEISMIC CONSIDERATIONS

According to the International Building Code (IBC) 2018 and ASCE 7-16, structures should be designed and constructed to withstand the effects of earthquakes and avoid failure during a maximum considered earthquake. The maximum considered earthquake (MCE) is a seismic event that has a 50-year exposure period with a 2% probability of exceedance. The 2500-year earthquake has a Moment Magnitude (M_w) of 7.3 and a Site Class Adjusted Peak Ground Acceleration (PGA_M) of **0.244g**, as determined by data provided by the IBC 2018 and ASCE 7-16 Standards.

Based on our findings from the field exploration and our knowledge of the local geological formation in the project area, the site can be classified as Site Class D in accordance with International Building Code (IBC) 2018 and ASCE 7-16. The seismic design parameters obtained based on IBC2018 and ASCE 7-16 are summarized in table below. The design response spectrum curve, as presented in the appendix, was developed based on the S_{DS} and S_{D1} values according to IBC2018 and ASCE 7-16.

Summary of Seismic Design Parameters

| Site Location (Latitude, Longitude) | Site Classification | S_s | S_1 | F_a | F_v | S_{DS} | S_{D1} |
|--|---------------------|--------|--------|-------|-------|----------|----------|
| 32.1068°, -81.1561° | D | 0.307g | 0.112g | 1.555 | 2.375 | 0.318g | 0.177g |

- The Site Class for this site was determined based on the soil properties to the maximum exploration depth and estimated soil properties below the maximum exploration depth to 100 feet based on our experience with the geologic conditions of the site area in accordance with the 2018 IBC and ASCE 7-16.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of

Geotechnical Engineering Report_REV03

Groves K-12 School ■ Garden City, Chatham County, Georgia

November 5, 2020 ■ Terracon Project No. ES205016



pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client, and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

The field exploration program consisted of the following:

| Number of Exploration Locations | Type of Exploration | Boring Depth (feet) ¹ | Planned Location |
|---------------------------------|--|----------------------------------|----------------------------|
| 9 | Cone Penetration Test (CPT) Sounding | 46 to 53 | Building area |
| 2 | CPT Sounding | 46 to 53 | Grandstand area |
| 11 | Hand Auger (HA) Boring | 5 | Parking and driveway areas |
| 9 | Hand Auger (HA) Boring and Pavement Coring | 5 or refusal | Access road |

1. Below ground surface.

Boring Layout and Elevations: We used handheld GPS equipment to locate borings with an estimated horizontal accuracy of +/-20 feet. Field measurements from existing site features was utilized.

Subsurface Exploration Procedures: We pushed the CPT soundings with a truck-mounted drill rig. CPT sounding is a new technology in which an electronically instrumented cone penetrometer is hydraulically pushed through the soil while nearly continuous readings are recorded to a portable computer. The cone is equipped with electronic load cells to measure tip resistance and sleeve resistance and a pressure transducer to measure the generated ambient pore pressure. The face of the cone has an apex angle of 60° and an area of 10 cm². Digital data representing the tip resistance, friction resistance, pore water pressure, and probe inclination angle are recorded about every 2 centimeters while advancing through the ground at a rate between 1½ and 2½ centimeters per second. These measurements are correlated to various soil properties used for geotechnical design. No soil samples are gathered through this subsurface investigation technique.

CPT testing was conducted in general accordance with ASTM D5778 "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils." Upon completion, the CPT data collected was analyzed and processed by the project engineer.

Hand auger borings were conducted in general accordance with ASTM D 1452-80, Standard Practice for Soil Investigation and Sampling by Auger Borings. In this test, hand auger borings are drilled by rotating and advancing a bucket auger to the desired depths while periodically removing the auger from the hole to clear and examine the auger cuttings. The soils were classified in accordance with ASTM D2488.

Our exploration team prepared field boring logs as part of the drilling operations. The field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Ground water observations were also recorded.

Final boring logs were prepared from the field logs. The final boring logs represent the engineer's interpretation of the field logs.

SITE LOCATION AND EXPLORATION PLAN

Contents:

Exhibit A-1 Site Location Plan

Exhibit A-2 Exploration Plan

EXHIBIT A-1 – SITE LOCATION

Groves K-12 School ■ Garden City, Georgia
February 12, 2020 ■ Terracon Project No. ES205016

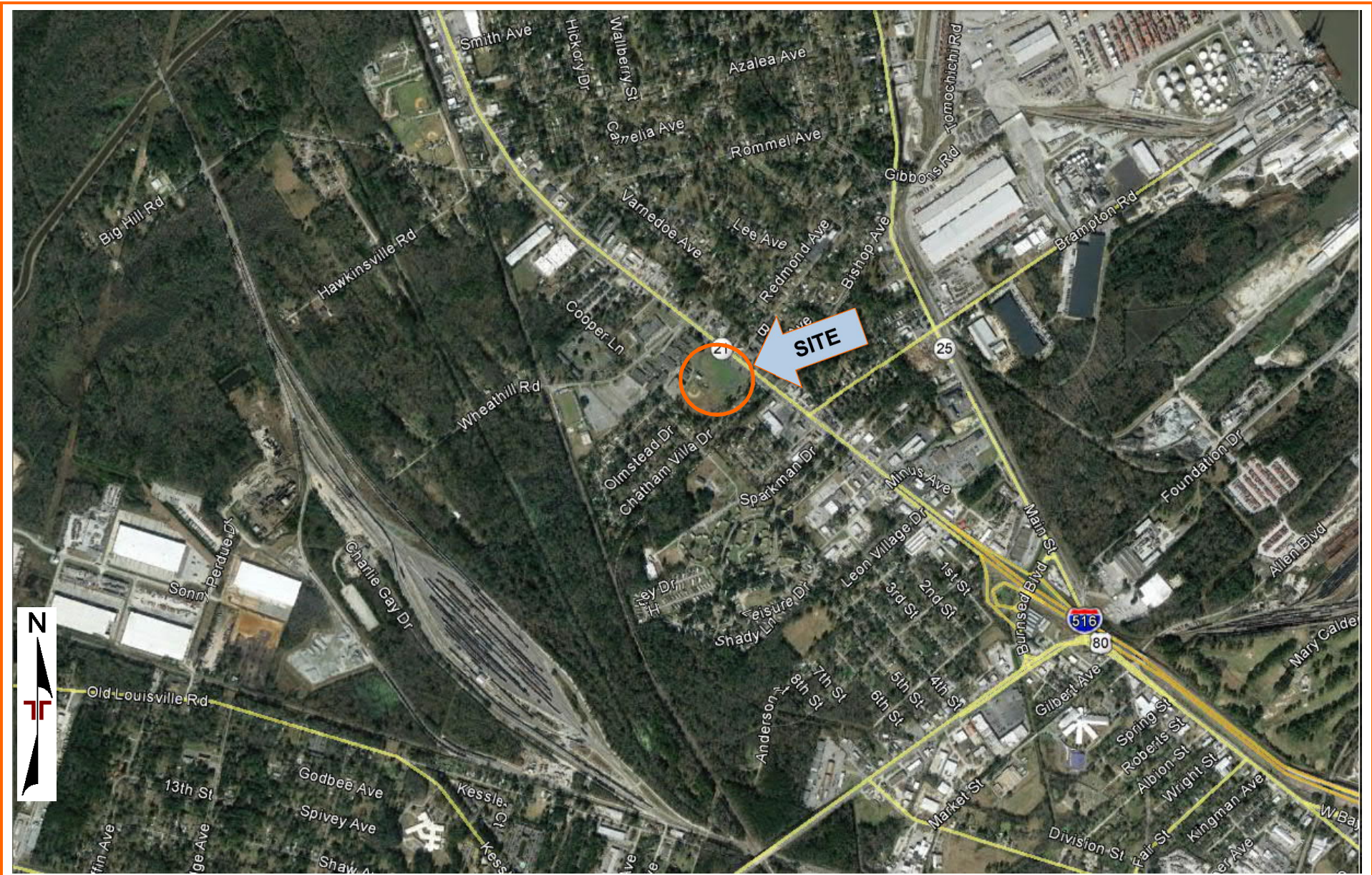


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXHIBIT A-2-1 – EXPLORATION PLAN

Groves K-12 School ■ Garden City, Georgia
February 12, 2020 ■ Terracon Project No. ES205016

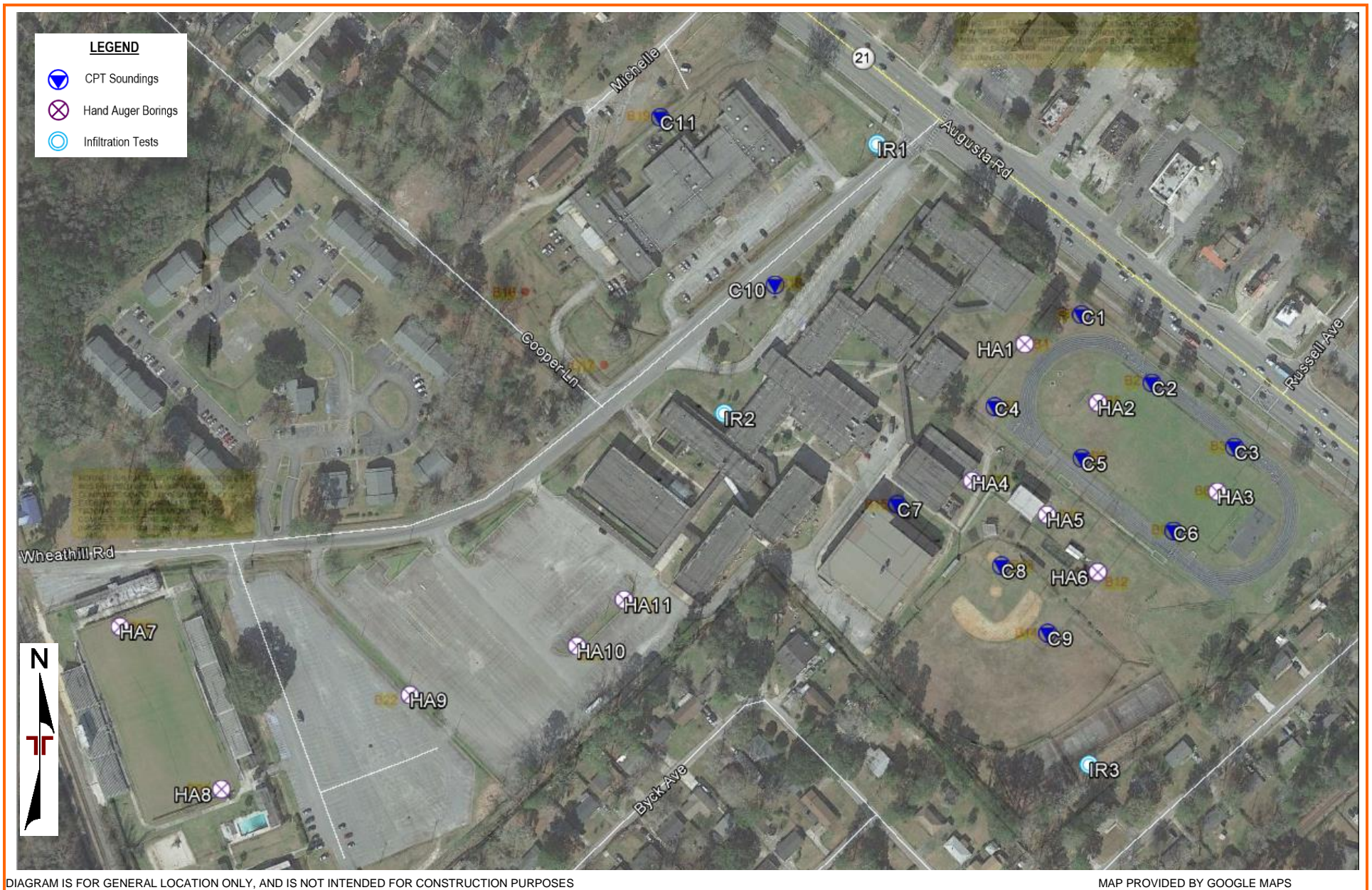


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY GOOGLE MAPS

EXHIBIT A-2-2 – EXPLORATION PLAN

Groves K-12 School ■ Garden City, Georgia
May 18, 2020 ■ Terracon Project No. ES205016



DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

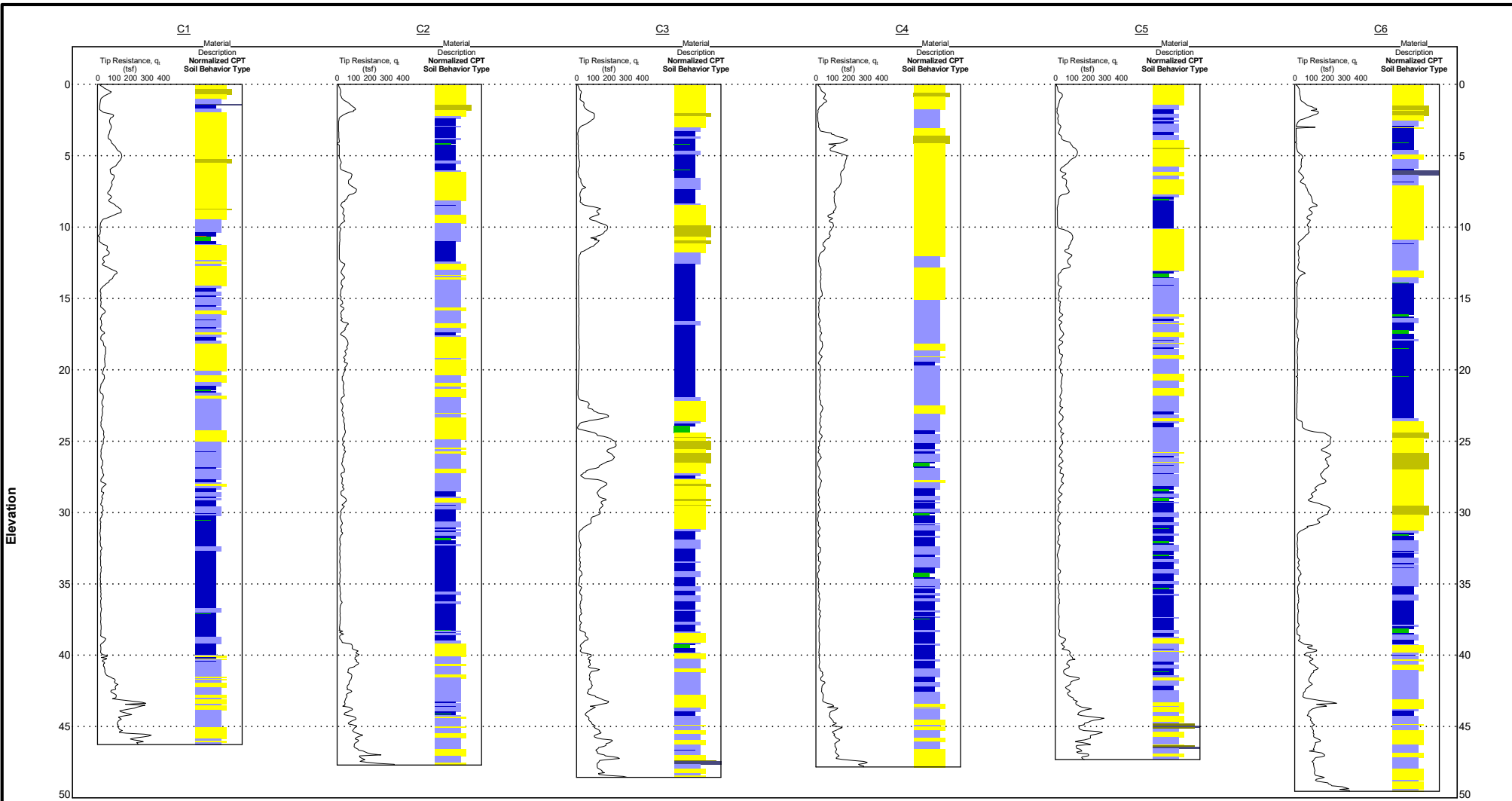
MAP PROVIDED BY GOOGLE MAPS

EXPLORATION RESULTS

Contents:

- Exhibit A-3** CPT Sounding Cross-Section (2 pages)
- Exhibit A-4** CPT Sounding Logs (8 pages)
- Exhibit A-5** Hand Auger Boring Logs (3 pages)
- Exhibit A-6** Infiltration Tests (3 pages)
- Exhibit A-7** Hand Auger Boring Logs for Access Road (2 pages)

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT, 11X17 CPT FENCE ES205016 GROVES K-12 SCHOOL.GPJ TERRACON DATATEMPLATE.GDT 4/5/20



Explanation

- C1 — Borehole Number
- Moisture Content — %w
- Sampling —
- LL PL — Liquid and Plastic Limits
- Borehole Lithology
- AR — Borehole Refusal
- BT — Borehole Termination Type
- Water Level Reading at time of drilling.
- Water Level Reading after drilling.

NOTES:
 See Exhibit for orientation of soil profile.
 See General Notes in Appendix for symbols and soil classifications.
 Soils profile provided for illustration purposes only.
 Soils between borings may differ.
 AR - Auger Refusal
 BT - Boring Termination

Project Manager:
 Drawn by: YJ
 Approved by: GL
 Date: 4/5/2020

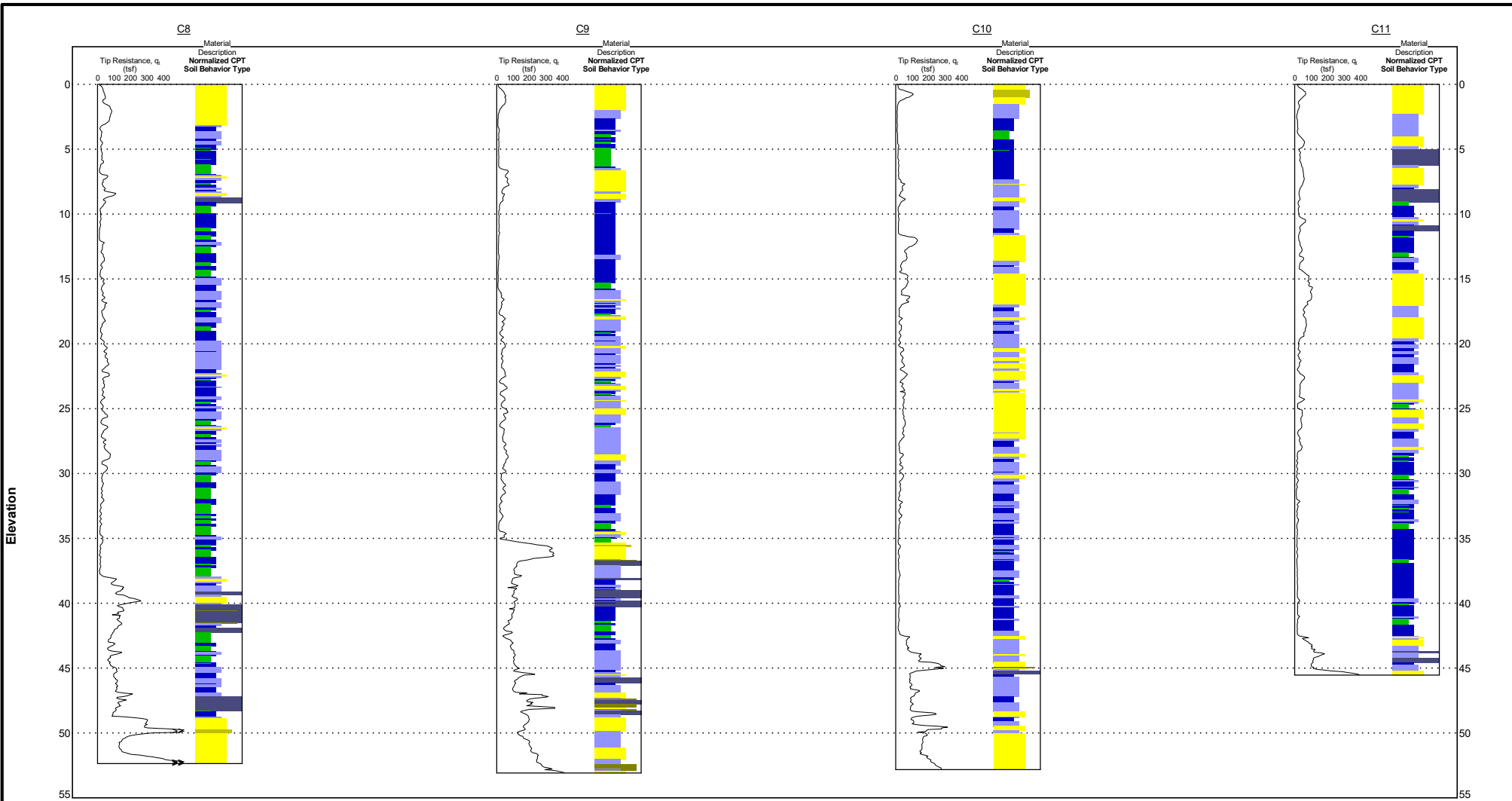
Project No.: ES205016
 Scale: N.T.S.
 File Name:

Terracon
 2201 Rowland Ave
 Savannah, GA
 PH. 912-629-4000 FAX. 912-629-4001

SUBSURFACE PROFILE
 GROVES K-12 SCHOOL
 GARDEN CITY, GA

EXHIBIT
 A-3-1

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. 11X17 CPT FENCE ES205016 GROVES K-12 SCHOOL.GPJ TERRACON.DATATEMPLATE.GDT 4/5/20



Explanation

- C8 — Borehole Number
- Moisture Content — %w
- Sampling —
- LL PL — Liquid and Plastic Limits
- Borehole Lithology
- AR — Borehole Refusal
- BT — Borehole Termination Type
- Water Level Reading at time of drilling.
- Water Level Reading after drilling.

NOTES:
 See Exhibit for orientation of soil profile.
 See General Notes in Appendix for symbols and soil classifications.
 Soils profile provided for illustration purposes only.
 Soils between borings may differ.
 AR - Auger Refusal
 BT - Boring Termination

Project Manager:
 Drawn by: YJ
 Approved by: GL
 Date: 4/5/2020

Project No.: ES205016
 Scale: N.T.S.
 File Name:

Terracon
 2201 Rowland Ave
 Savannah, GA
 PH. 912-629-4000 FAX. 912-629-4001

SUBSURFACE PROFILE
 GROVES K-12 SCHOOL
 GARDEN CITY, GA

EXHIBIT
 A-3-2

CPT LOG NO. C1

PROJECT: Groves K-12 School

CLIENT: Parsons Program Manager
Savannah, GA

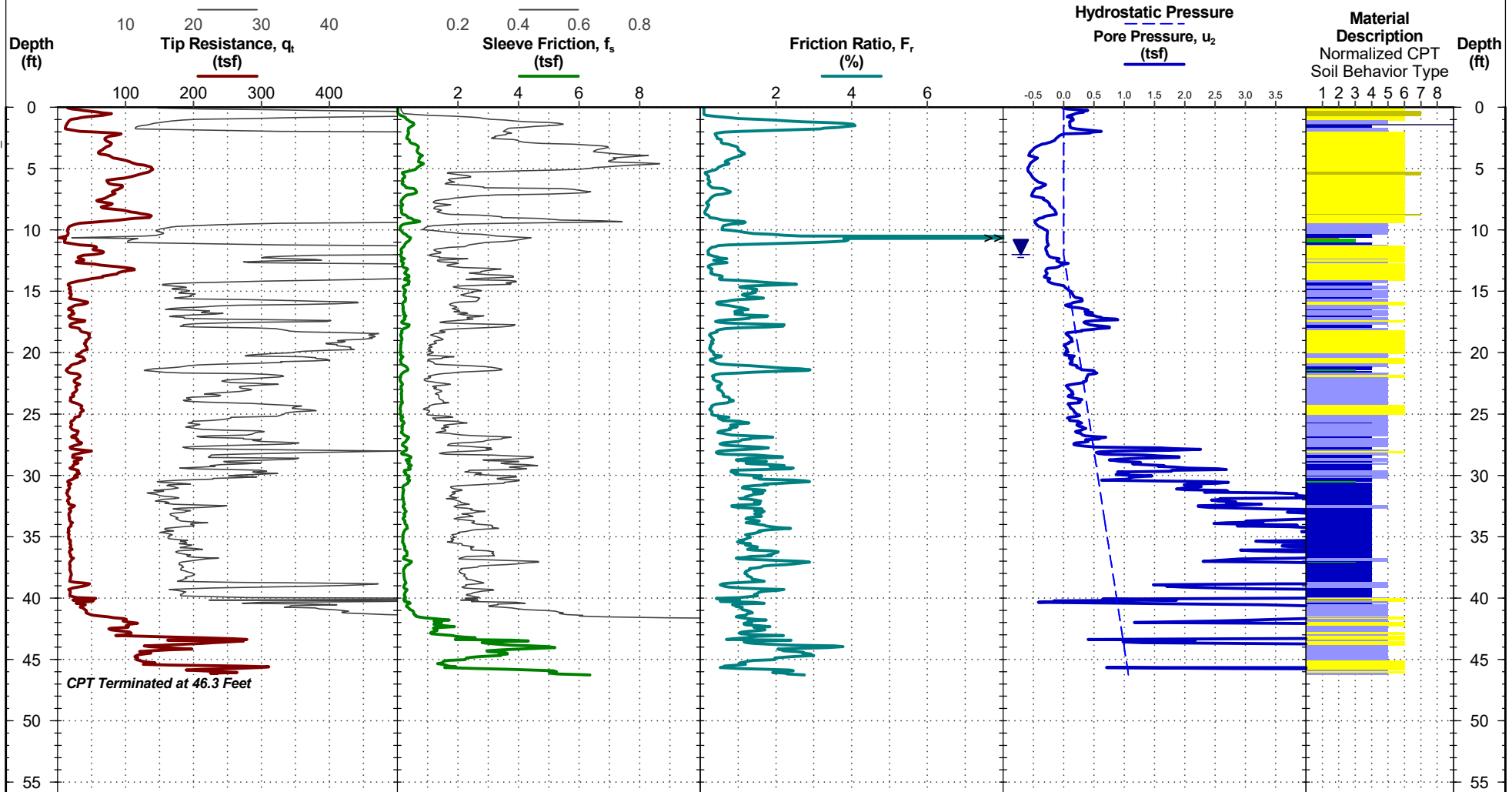
TEST LOCATION: See Exhibit A-2

SITE: Garden City, GA

Latitude: 32.10753°

Longitude: -81.15606°

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT ES205016 GROVES K-12 SCHOO.GPJ TERRACON_DATATEMPLATE.GDT 4/5/20



See Exhibit A-3 for description of field procedures.

See Appendix C for explanation of symbols and abbreviations.

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

WATER LEVEL OBSERVATION

▼ 12 ft measured water depth
(used in normalizations and correlations;
see Appendix C)

Probe no. 5311 with net area ratio of .874
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/7/2020
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in



CPT Started: 3/18/2020

Rig: Pagani TG73-200

Project No.: ES205016

CPT Completed: 3/18/2020

Operator: RF

Exhibit: A-4-1

CPT LOG NO. C2

PROJECT: Groves K-12 School

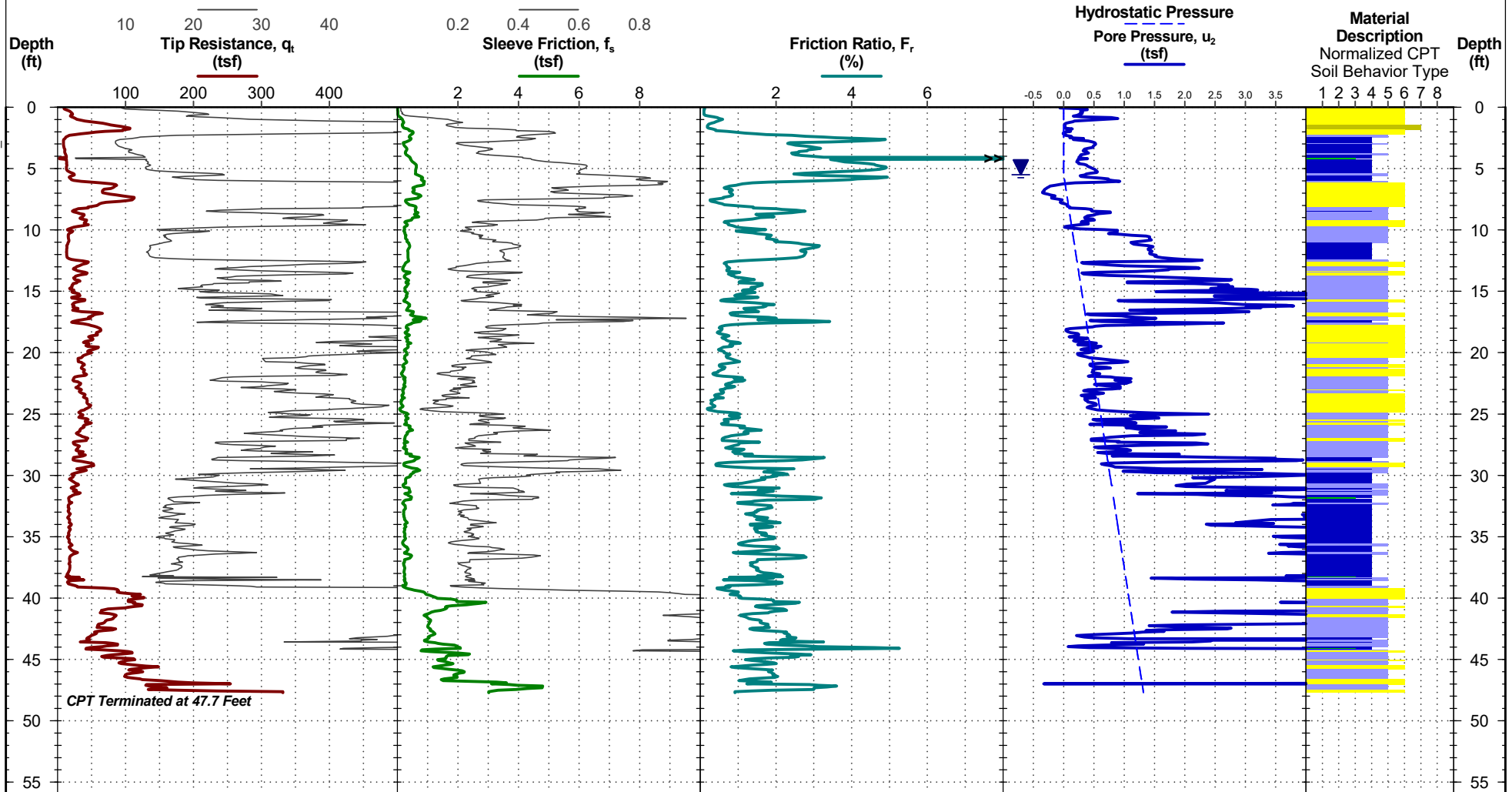
CLIENT: Parsons Program Manager
Savannah, GA

TEST LOCATION: See Exhibit A-2

SITE: Garden City, GA

Latitude: 32.10718°
Longitude: -81.15563°

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT ES205016 GROVES K-12 SCHOO.GPJ TERRACON_DATATEMPLATE.GDT 4/5/20



See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

WATER LEVEL OBSERVATION

▼ 5.5 ft measured water depth
(used in normalizations and correlations;
see Appendix C)

Probe no. 5311 with net area ratio of .874
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/7/2020
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in



CPT Started: 3/18/2020

Rig: Pagani TG73-200

Project No.: ES205016

CPT Completed: 3/18/2020

Operator: RF

Exhibit: A-4-2

CPT LOG NO. C3

PROJECT: Groves K-12 School

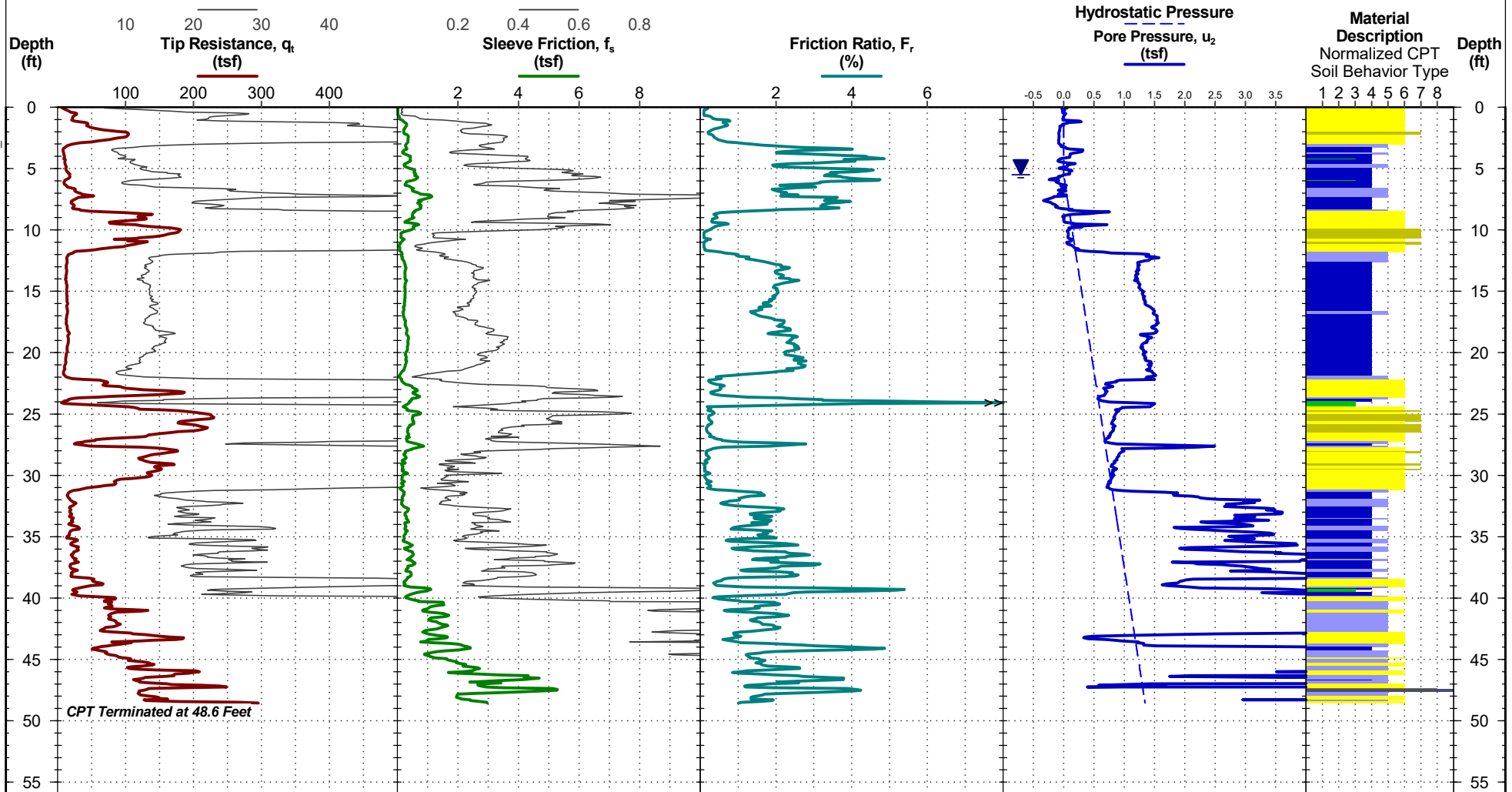
CLIENT: Parsons Program Manager
Savannah, GA

TEST LOCATION: See Exhibit A-2

SITE: Garden City, GA

Latitude: 32.10686°
Longitude: -81.15513°

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT ES205016 GROVES K-12 SCHOO.GPJ TERRACON_DATATEMPLATE.GDT 4/5/20



See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

WATER LEVEL OBSERVATION

▼ 5.5 ft measured water depth
(used in normalizations and correlations;
see Appendix C)

Probe no. 5311 with net area ratio of .874
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/7/2020
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in



CPT Started: 3/18/2020

Rig: Pagani TG73-200

Project No.: ES205016

CPT Completed: 3/18/2020

Operator: RF

Exhibit: A-4-3

CPT LOG NO. C4

PROJECT: Groves K-12 School

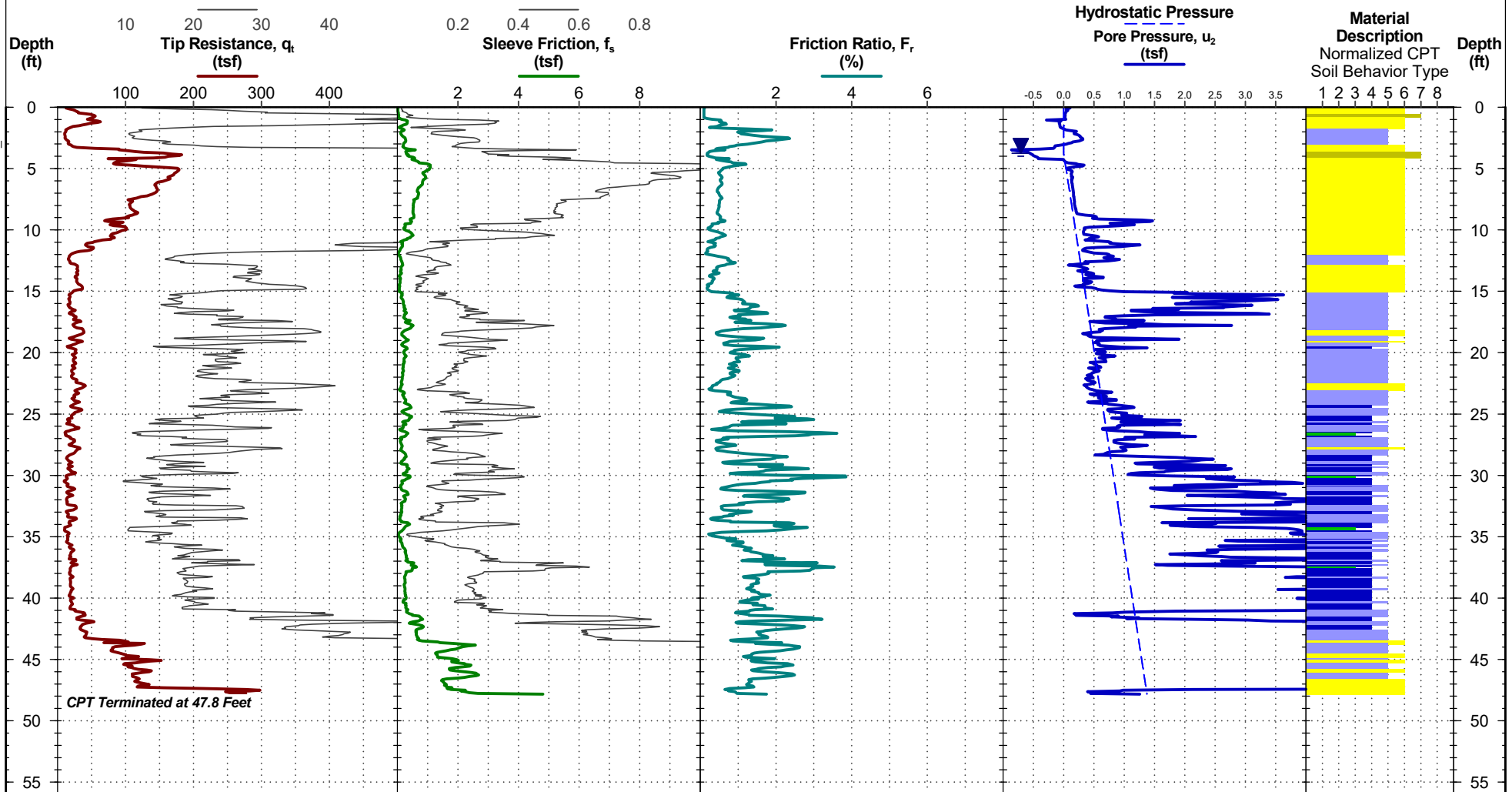
CLIENT: Parsons Program Manager
Savannah, GA

TEST LOCATION: See Exhibit A-2

SITE: Garden City, GA

Latitude: 32.10706°
Longitude: -81.15658°

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT: ES205016 GROVES K-12 SCHOO.GPJ TERRACON_DATATEMPLATE.GDT 4/5/20



See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

WATER LEVEL OBSERVATION

▼ 3.75 ft estimated water depth
(used in normalizations and correlations;
see Appendix C)

Probe no. 5311 with net area ratio of .874
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/7/2020
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in



CPT Started: 3/18/2020

Rig: Pagani TG73-200

Project No.: ES205016

CPT Completed: 3/18/2020

Operator: RF

Exhibit: A-4-4

CPT LOG NO. C5

PROJECT: Groves K-12 School

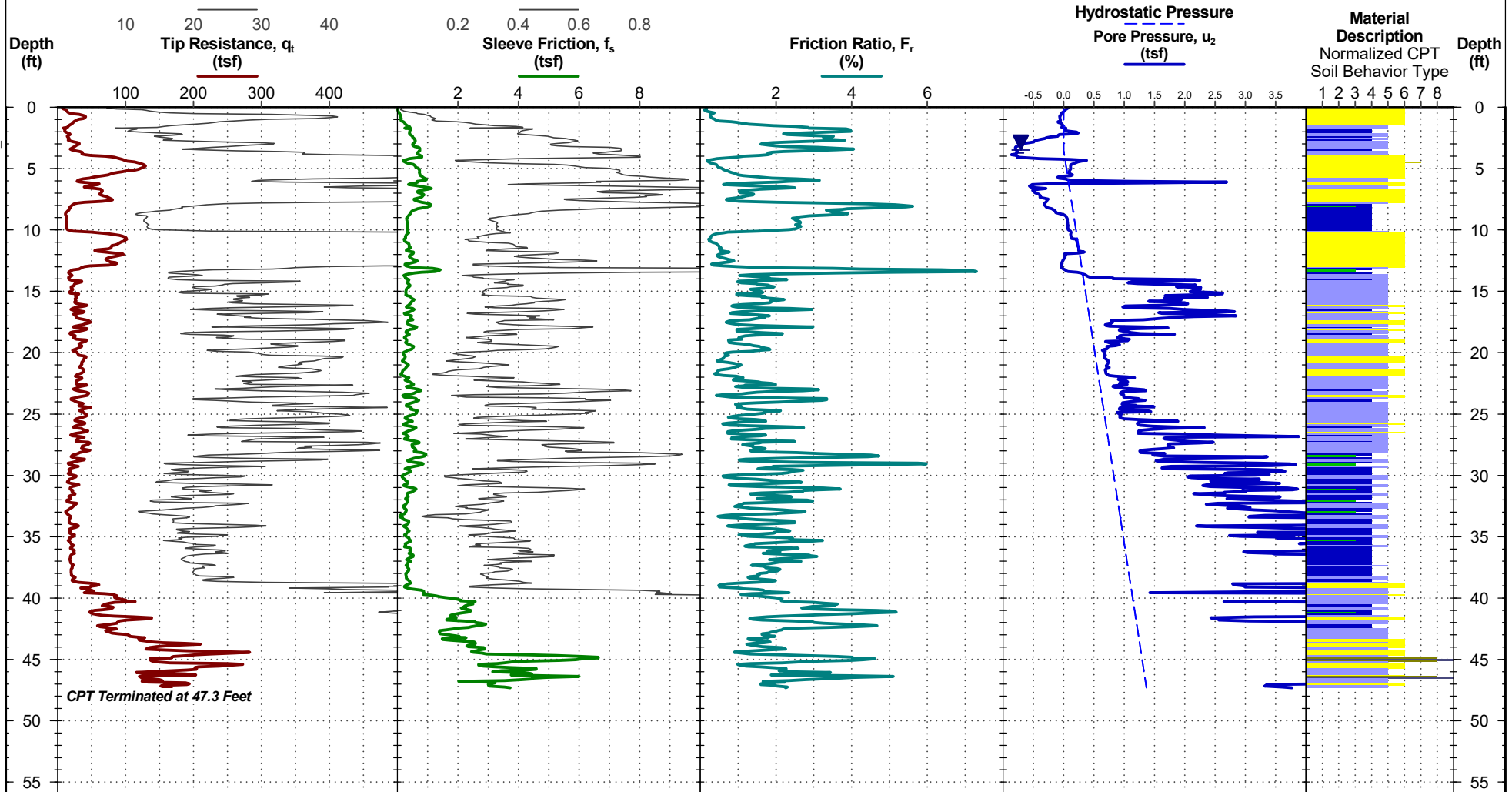
CLIENT: Parsons Program Manager
Savannah, GA

TEST LOCATION: See Exhibit A-2

SITE: Garden City, GA

Latitude: 32.1068°
Longitude: -81.15606°

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT ES205016 GROVES K-12 SCHOO.GPJ TERRACON_DATATEMPLATE.GDT 4/5/20



See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

WATER LEVEL OBSERVATION

3.5 ft measured water depth
(used in normalizations and correlations;
see Appendix C)

Probe no. 5311 with net area ratio of .874
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/7/2020
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in



CPT Started: 3/18/2020

Rig: Pagani TG73-200

Project No.: ES205016

CPT Completed: 3/18/2020

Operator: RF

Exhibit: A-4-5

CPT LOG NO. C6

PROJECT: Groves K-12 School

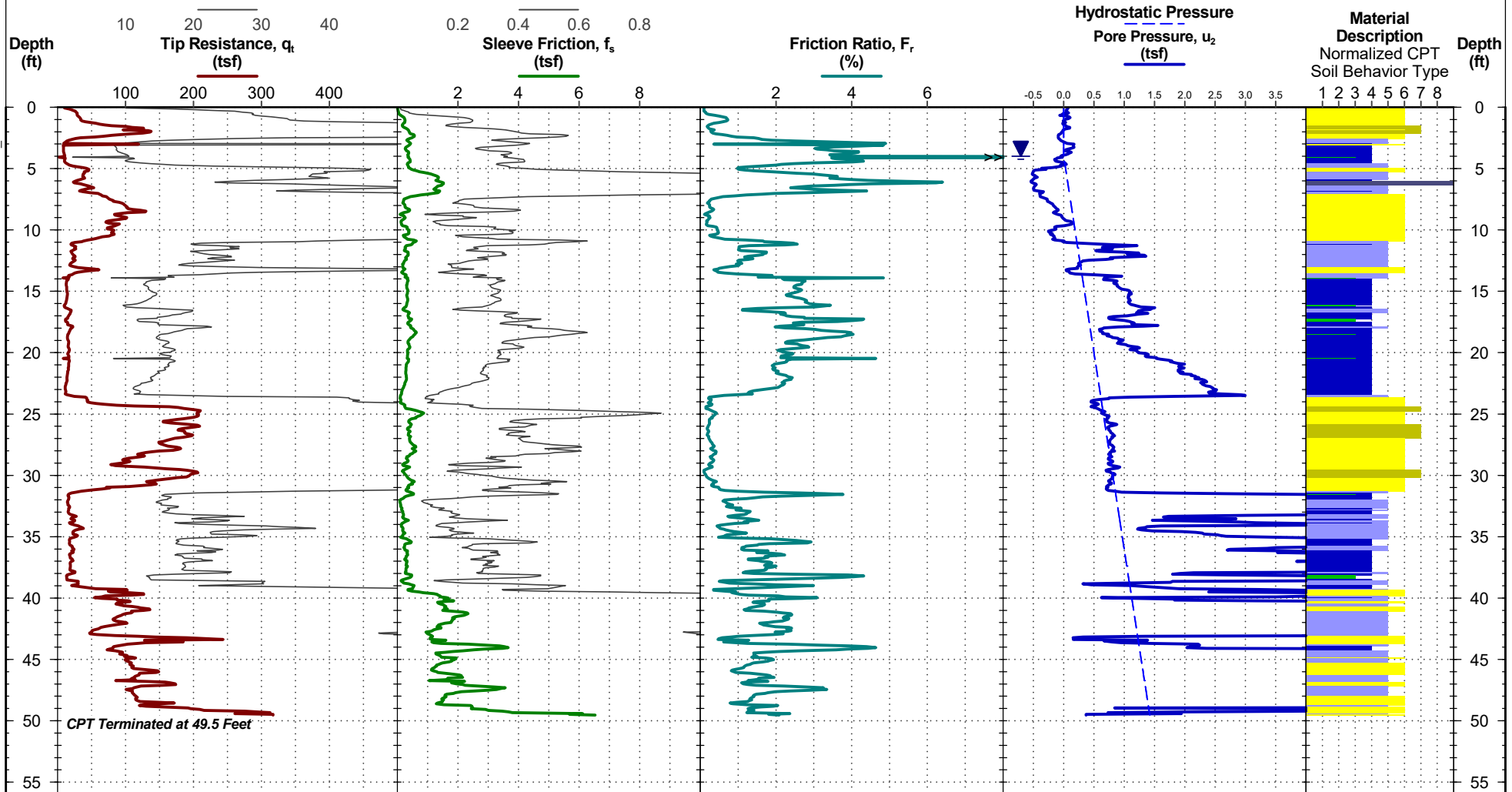
CLIENT: Parsons Program Manager
Savannah, GA

TEST LOCATION: See Exhibit A-2

SITE: Garden City, GA

Latitude: 32.10643°
Longitude: -81.1555°

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT ES205016 GROVES K-12 SCHOO.GPJ TERRACON.DATATEMPLATE.GDT 4/5/20



See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

WATER LEVEL OBSERVATION

▼ 4 ft measured water depth
(used in normalizations and correlations;
see Appendix C)

Probe no. 5311 with net area ratio of .874
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/7/2020
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in



CPT Started: 3/18/2020

Rig: Pagani TG73-200

Project No.: ES205016

CPT Completed: 3/18/2020

Operator: RF

Exhibit: A-4-6

CPT LOG NO. C8

PROJECT: Groves K-12 School

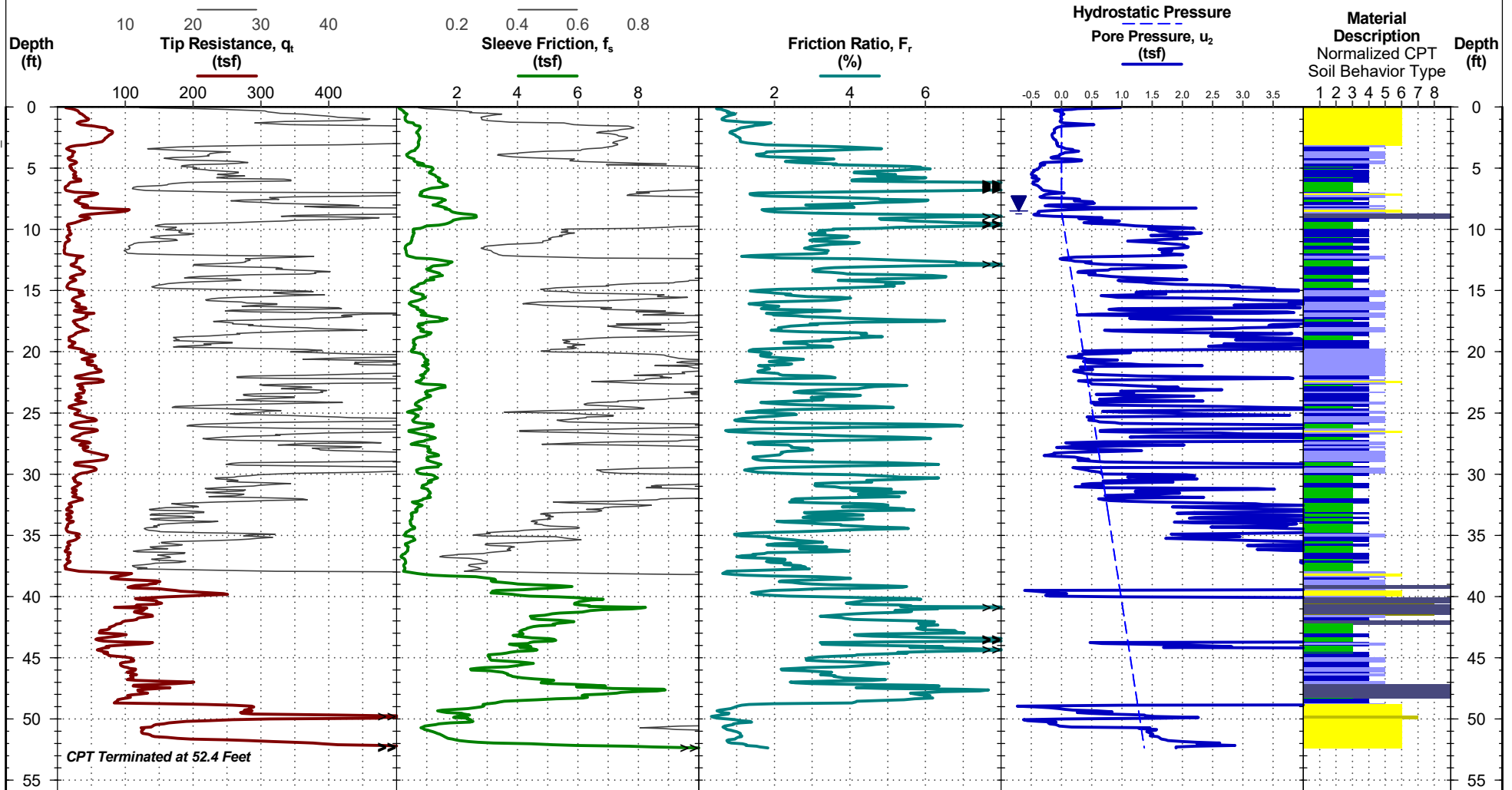
CLIENT: Parsons Program Manager
Savannah, GA

TEST LOCATION: See Exhibit A-2

SITE: Garden City, GA

Latitude: 32.10625°
Longitude: -81.15655°

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT ES205016 GROVES K-12 SCHOO.GPJ TERRACON_DATATEMPLATE.GDT 4/5/20



See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

WATER LEVEL OBSERVATION

▼ 8.5 ft measured water depth
(used in normalizations and correlations;
see Appendix C)

Probe no. 4815 with net area ratio of .87
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 2/13/2020
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in



CPT Started: 3/23/2020

Rig: Pagani TG73-200

Project No.: ES205016

CPT Completed: 3/23/2020

Operator: BR

Exhibit: A-4-7

CPT LOG NO. C9

PROJECT: Groves K-12 School

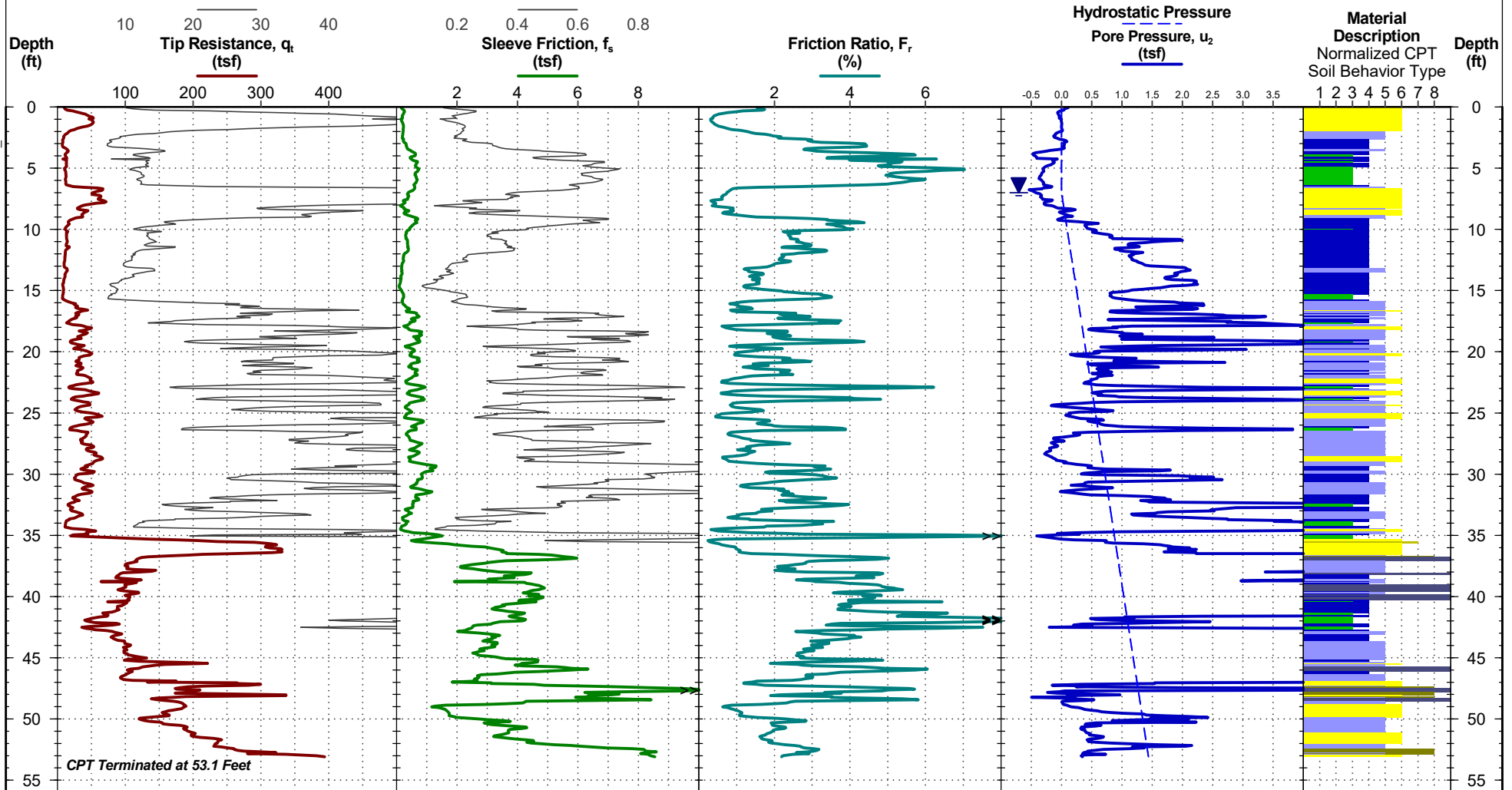
CLIENT: Parsons Program Manager
Savannah, GA

TEST LOCATION: See Exhibit A-2

SITE: Garden City, GA

Latitude: 32.1059°
Longitude: -81.15626°

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT ES205016 GROVES K-12 SCHOO.GPJ TERRACON_DATATEMPLATE.GDT 4/5/20



See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

WATER LEVEL OBSERVATION

▼ 7 ft measured water depth
(used in normalizations and correlations;
see Appendix C)

Probe no. 4815 with net area ratio of .87
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 2/13/2020
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in



CPT Started: 3/23/2020

Rig: GP # 504

Project No.: ES205016

CPT Completed: 3/23/2020

Operator: BR

Exhibit: A-4-8

CPT LOG NO. C10

PROJECT: Groves K-12 School

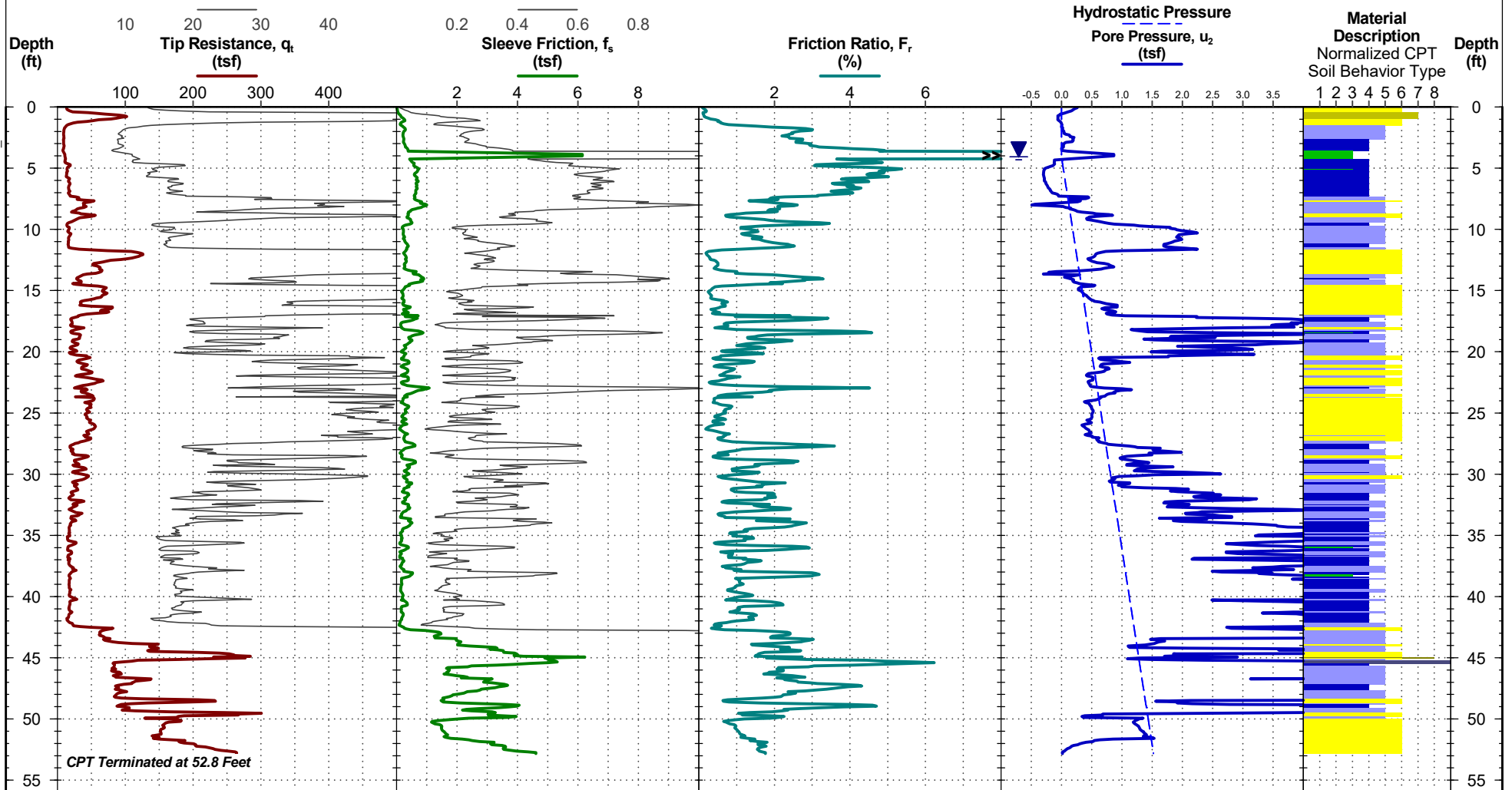
CLIENT: Parsons Program Manager
Savannah, GA

TEST LOCATION: See Exhibit A-2

SITE: Garden City, GA

Latitude: 32.10769°
Longitude: -81.15791°

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT ES205016 GROVES K-12 SCHOO.GPJ TERRACON_DATATEMPLATE.GDT 4/5/20



See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

WATER LEVEL OBSERVATION

▼ 4.08 ft measured water depth
(used in normalizations and correlations;
see Appendix C)

Probe no. 5311 with net area ratio of .874
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/7/2020
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in



CPT Started: 3/18/2020

Rig: GP # 504

Project No.: ES205016

CPT Completed: 3/18/2020

Operator: RF

Exhibit: A-4-9

CPT LOG NO. C11

PROJECT: Groves K-12 School

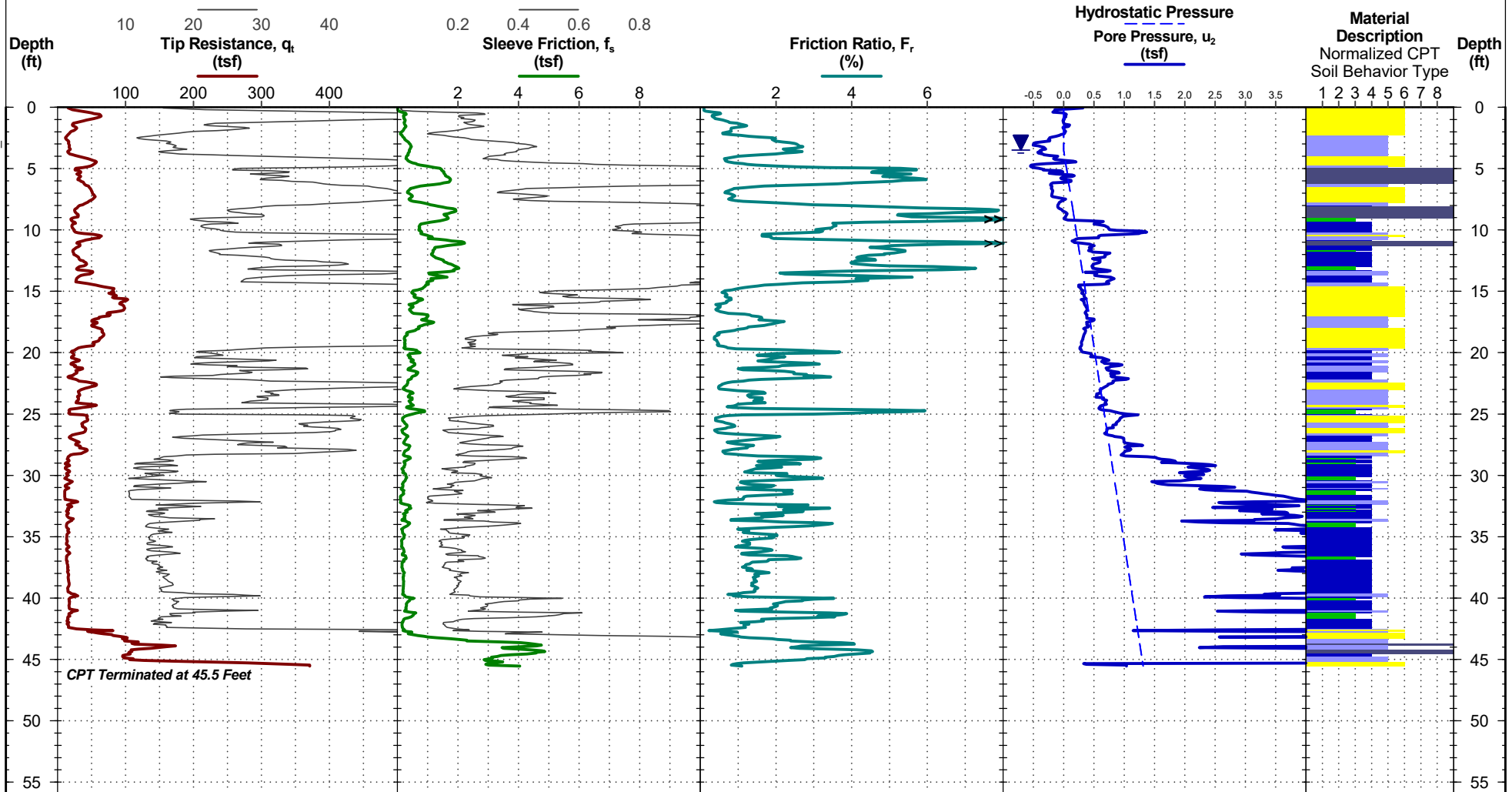
CLIENT: Parsons Program Manager
Savannah, GA

TEST LOCATION: See Exhibit A-2

SITE: Garden City, GA

Latitude: 32.10854°
Longitude: -81.15861°

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. CPT REPORT ES205016 GROVES K-12 SCHOO.GPJ TERRACON.DATATEMPLATE.GDT 4/5/20



See Exhibit A-3 for description of field procedures.
See Appendix C for explanation of symbols and abbreviations.

CPT sensor calibration reports available upon request.

- 1 Sensitive, fine grained
- 2 Organic soils - clay
- 3 Clay - silty clay to clay
- 4 Silt mixtures - clayey silt to silty clay
- 5 Sand mixtures - silty sand to sandy silt
- 6 Sands - clean sand to silty sand
- 7 Gravelly sand to dense sand
- 8 Very stiff sand to clayey sand
- 9 Very stiff fine grained

WATER LEVEL OBSERVATION

▼ 3.5 ft estimated water depth
(used in normalizations and correlations;
see Appendix C)

Probe no. 5311 with net area ratio of .874
U2 pore pressure transducer location
Manufactured by Geotech A.B.; calibrated 1/7/2020
Tip and sleeve areas of 10 cm² and 150 cm²
Ring friction reducer with O.D. of 1.875 in



CPT Started: 3/18/2020

Rig: Pagani TG73-200

Project No.: ES205016

CPT Completed: 3/18/2020

Operator: RF

Exhibit: A-4-10

Hand Auger Records

Project Name: Groves K-12 School

Project No.: ES205016

Project Location: Garden City, Georgia

| HA1 | | |
|-----------------------------|--|---------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 2 | Topsoil - Brown fine SAND with grass roots | -- |
| 2 to 6 | Light brown fine SAND | SP |
| 6 to 12 | Light gray/orange fine clayey SAND | SC |
| 12 to 36 | Light brown/orange fine SAND with clay | SP-SC |
| 36 to 60 | Light gray/orange fine sandy CLAY | CL |
| Groundwater noted @ 60" BGS | | No mottling noted |

| HA2 | | |
|-----------------------------|---|---------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 16 | Topsoil - Dark brown fine silty SAND with grass roots | -- |
| 16 to 24 | Dark brown/light brown fine silty SAND | SM |
| 24 to 30 | Gray/orange fine clayey SAND | SC |
| 30 to 60 | Gray/orange fine sandy CLAY | CL |
| Groundwater noted @ 30" BGS | | No mottling noted |

| HA3 | | |
|-----------------------------|---|---------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 20 | Topsoil - Dark brown fine silty SAND with grass roots | -- |
| 20 to 30 | Dark brown/light brown fine silty SAND | SM |
| 30 to 42 | Gray/orange fine clayey SAND | SC |
| 42 to 60 | Gray/orange fine sandy CLAY | CL |
| Groundwater noted @ 30" BGS | | No mottling noted |

| HA4 | | |
|-----------------------------|---|---------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 36 | Topsoil - gray fine silty SAND with grass roots | -- |
| 36 to 60 | Light gray/orange fine sandy CLAY | CL |
| Groundwater noted @ 36" BGS | | No mottling noted |

Note: BGS = Below Ground Surface

Hand Auger Records



Project Name: Groves K-12 School

Project No.: ES205016

Project Location: Garden City, Georgia

| HA5 | | |
|-----------------------------|---|---------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 6 | Topsoil - Dark brown fine silty SAND with grass roots | -- |
| 6 to 12 | Light gray fine to coarse SAND with silt | SP-SM |
| 12 to 24 | Dark brown fine silty SAND | SM |
| 24 to 36 | Light brown fine SAND | SP-SM |
| 36 to 50 | Light gray/orange fine clayey SAND | SC |
| 50 to 60 | Light gray/orange fine sandy CLAY | CL |
| Groundwater noted @ 36" BGS | | No mottling noted |

| HA6 | | |
|-----------------------------|---|---------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 12 | Topsoil - Dark brown fine SAND with grass roots | -- |
| 12 to 24 | Dark brown/light brown fine silty SAND | SM |
| 24 to 36 | Light gray/orange fine silty SAND | SM |
| 36 to 60 | Light gray/orange fine sandy CLAY | CL |
| Groundwater noted @ 54" BGS | | No mottling noted |

| HA7 | | |
|-----------------------------|---|---------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 11 | Topsoil - dark brown fine silty SAND with grass roots | -- |
| 11 to 36 | Light brown fine silty SAND | SM |
| 36 to 40 | Light brown/orange fine silty SAND | SM |
| 40 to 60 | Light gray/orange/red sandy CLAY | CL |
| Groundwater noted @ 36" BGS | | No mottling noted |

| HA8 | | |
|-----------------------------|--|---------------------|
| BGS) | Material Description | USCS Classification |
| 0 to 4 | Topsoil - Brown fine silty SAND with grass roots | -- |
| 4 to 12 | Light brown/orange fine SAND with clay | SP-SC |
| 12 to 24 | Dark gray fine silty SAND | SM |
| 24 to 36 | Light brown fine SAND | SP-SC |
| 36 to 48 | Light brown/orange fine SAND | SP-SC |
| 48 to 60 | Light gray/orange fine sandy CLAY | CL |
| Groundwater noted @ 48" BGS | | No mottling noted |

Note: BGS = Below Ground Surface

Hand Auger Records

Project Name: Groves K-12 School

Project No.: ES205016

Project Location: Garden City, Georgia

| HA9 | | |
|-----------------------------|--|---------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 6 | Topsoil - Gray fine SAND with gravel | -- |
| 6 to 48 | Dark gray/brown fine silty SAND | SM |
| 48 to 60 | Light gray/orange/brown fine clayey SAND | SC |
| Groundwater noted @ 48" BGS | | No mottling noted |

| HA10 | | |
|-----------------------------|--|---------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 11 | Topsoil - dark brown fine silty SAND with gravel | -- |
| 11 to 30 | Light gray/orange fine SAND with silt | SP-SM |
| 30 to 40 | Dark brown/dark gray silty SAND | SM |
| 40 to 48 | Light gray fine silty SAND | SM |
| 48 to 60 | Light gray/orange fine clayey SAND | SC |
| Groundwater noted @ 48" BGS | | No mottling noted |

| HA11 | | |
|----------------------|---|---------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 8 | Topsoil - Dark brown fine silty SAND with grass roots | -- |
| 8 to 36 | Dark brown/light gray/orange SAND with clay | SP-SC |
| 36 to 48 | Light gray fine to medium SAND with silt | SP-SM |
| 48 to 60 | Light gray/dark gray fine SAND with silt | SP-SM |
| No groundwater noted | | No mottling noted |

Note: BGS = Below Ground Surface

Hand Auger Boring Log



Project Name: Groves K-12 School
 Project No.: ES205016
 Project Location: Garden City, Georgia

Tested date: May 4, 2020

Performed by: Adam L.

| HA12 | | |
|---------------------------------|--------------------------------------|------------------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 8 | 4" Asphalt core, 4" soil cement base | |
| 8 to 10 | Dark gray SILTY SAND | SM |
| Auger refusal @ 10" | | |
| Groundwater not observed | | Mottling not observed |

| HA13 | | |
|---------------------------------|--------------------------------------|-----------------------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 13 | 4" Asphalt core, 9" soil cement base | |
| 13 to 28 | Gray fine SILTY SAND | SM |
| 28 to 38 | Dark gray fine SILTY SAND | SM |
| 38 to 48 | Dark gray SANDY LEAN CLAY | CL |
| 48 to 60 | Gray/brown SANDY LEAN CLAY | CL |
| Groundwater not observed | | Mottling observed @48" BGS |

| HA14 | | |
|---------------------------------|--|------------------------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 9.5 | 4.5" Asphalt core, 5" soil cement base | |
| 9.5 to 30 | Dark gray/gray fine SILTY SAND | SM |
| 30 to 36 | Dark gray SANDY LEAN CLAY | CL |
| 36 to 48 | Dark gray/brown SANDY LEAN CLAY | CL |
| 48 to 60 | Gray/brown SANDY LEAN CLAY | CL |
| Groundwater not observed | | Mottling observed @ 36" BGS |

| HA15 | | |
|---------------------------------|----------------------------|------------------------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 24 | Dark brown/gray SILTY SAND | SM |
| 24 to 60 | Gray/brown CLAYEY SAND | SC |
| Groundwater not observed | | Mottling observed @ 24" BGS |

| HA16 | | |
|---------------------------------|-----------------------------------|------------------------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 15 | Dark brown fine SILTY SAND | SM |
| 15 to 30 | Gray/brown CLAYEY SAND | SC |
| 30 to 48 | Gray/brown SANDY LEAN CLAY | CL |
| 48 to 60 | Gray/brownish red SANDY LEAN CLAY | CL |
| Groundwater not observed | | Mottling observed @ 30" BGS |

Hand Auger Boring Log



Project Name: Groves K-12 School
 Project No.: ES205016
 Project Location: Garden City, Georgia

Tested date: May 4, 2020

Performed by: Adam L.

| HA17 | | |
|--------------------------|--------------------------------|-----------------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 12 | 4.5" Asphalt core, 7.5" GAB | |
| 12 to 30 | Gray/dark gray fine SILTY SAND | SM |
| 30 to 60 | Gray/brown SANDY LEAN CLAY | CL |
| Groundwater not observed | | Mottling observed @ 30" BGS |

| HA18 | | |
|--------------------------|------------------------------------|-----------------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 24 | Dark brown/gray fine SILTY SAND | SM |
| 24 to 36 | Gray/brown SILTY SAND | SM |
| 36 to 60 | Gray/reddish brown SANDY LEAN CLAY | CL |
| Groundwater not observed | | Mottling observed @ 24" BGS |

| HA19 | | |
|--------------------------|--|-----------------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 12 | Dark brown fine SILTY SAND | SM |
| 12 to 15 | Light brown fine SILTY SAND | SM |
| 15 to 24 | Light brown/brownish orange CLAYEY SAND | SC |
| 24 to 36 | Gray/reddish brown SANDY LEAN CLAY | CL |
| 36 to 48 | Light gray/reddish brown SANDY LEAN CLAY | CL |
| 48 to 60 | Light gray/reddish brown CLAYEY SAND | SC |
| Groundwater not observed | | Mottling observed @ 15" BGS |

| HA20 | | |
|--------------------------|----------------------------|-----------------------------|
| Depth (in., BGS) | Material Description | USCS Classification |
| 0 to 24 | Dark brown fine SILTY SAND | SM |
| 24 to 38 | Gray fine SILTY SAND | SM |
| 38 to 60 | Gray/brown SILTY SAND | SM |
| Groundwater not observed | | Mottling observed @ 38" BGS |

Note: BGS=Below Ground Surface

SUPPORTING INFORMATION

Contents:

- Exhibit B-1** Seismic Design Parameters
- Exhibit B-2** General Notes
- Exhibit B-3** CPT-based Soil Classification

Seismic Design Parameters Based on IBC2018 Code and ASCE 7-16 Standard

Terracon Project Name: Groves K-12 School

Terracon Project Number: ES205016



Site Location: Garden City, Georgia

Latitude : 32.1068

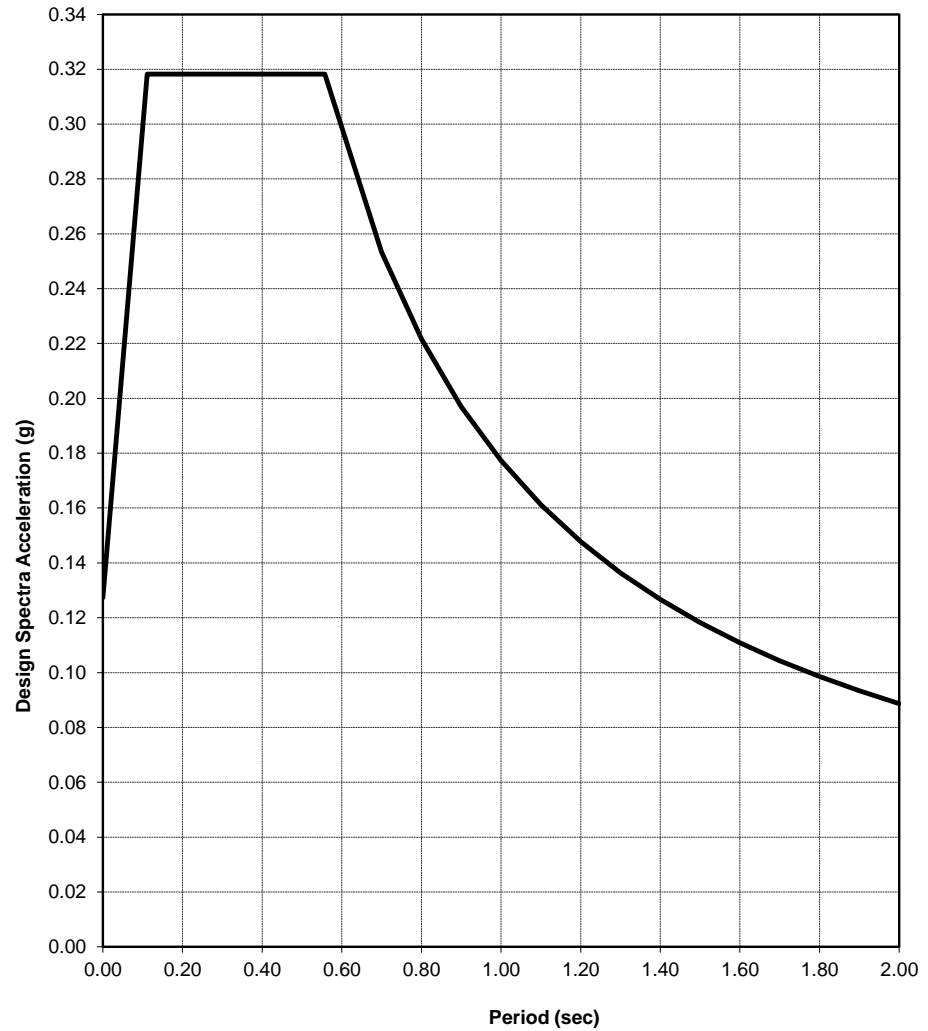
Longitude : -81.1561

Site Class: D

Design Response Spectrum for the Site Class

| | |
|----------------|----------------|
| S_s 0.307 | S_1 0.112 |
| F_a 1.555 | F_v 2.375 |
| S_{MS} 0.477 | S_{M1} 0.266 |
| S_{DS} 0.318 | S_{D1} 0.177 |

| | <u>Period (sec)</u> | <u>Sa (g)</u> |
|-------|---------------------|---------------|
| | 0.000 | 0.127 |
| T_0 | 0.111 | 0.318 |
| | 0.200 | 0.318 |
| T_s | 0.557 | 0.318 |
| T | 0.700 | 0.253 |
| | 0.800 | 0.222 |
| | 0.900 | 0.197 |
| | 1.000 | 0.177 |
| | 1.100 | 0.161 |
| | 1.200 | 0.148 |
| | 1.300 | 0.136 |
| | 1.400 | 0.127 |
| | 1.500 | 0.118 |
| | 1.600 | 0.111 |
| | 1.700 | 0.104 |
| | 1.800 | 0.099 |
| | 1.900 | 0.093 |
| | 2.000 | 0.089 |



GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

| | | | | | | | | | |
|-----------------|--|--------------|--------------------|--|---|--------------------|-------|--|--|
| SAMPLING | | Auger | GROUNDWATER | | Groundwater Initially Encountered | FIELD TESTS | (HP) | Hand Penetrometer | |
| | | Split Spoon | | | Groundwater Level After a Specified Period of Time | | (T) | Torvane | |
| | | Shelby Tube | | | Static Groundwater Level After a Specified Period of Time | | (b/f) | Standard Penetration Test (blows per foot) | |
| | | Macro Core | | | No Groundwater Observed | | (PID) | Photo-Ionization Detector | |
| | | No Recovery | | Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations. | | | (OVA) | Organic Vapor Analyzer | |
| | | Rock Core | | | | | | | |
| | | Ring Sampler | | | | | | | |

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

| STRENGTH TERMS | RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts. | | CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance | | |
|-----------------------|---|--|---|---|--|
| | Descriptive Term (Density) | Std. Penetration Resistance (blows per foot) | Descriptive Term (Consistency) | Undrained Shear Strength (kips per square foot) | Std. Penetration Resistance (blows per foot) |
| | Very Loose | 0 - 3 | Very Soft | less than 0.25 | 0 - 1 |
| | Loose | 4 - 9 | Soft | 0.25 to 0.50 | 2 - 4 |
| | Medium Dense | 10 - 29 | Medium-Stiff | 0.50 to 1.00 | 5 - 7 |
| | Dense | 30 - 50 | Stiff | 1.00 to 2.00 | 8 - 14 |
| | Very Dense | > 50 | Very Stiff | 2.00 to 4.00 | 15 - 30 |
| | | Hard | above 4.00 | > 30 | |

RELATIVE PROPORTIONS OF SAND AND GRAVEL

| Descriptive Term(s) of other constituents | Percent of Dry Weight |
|---|-----------------------|
| Trace | < 15 |
| With | 15 - 29 |
| Modifier | > 30 |

GRAIN SIZE TERMINOLOGY

| Descriptive Term(s) of other constituents | Percent of Dry Weight |
|---|--------------------------------------|
| Boulders | Over 12 in. (300 mm) |
| Cobbles | 12 in. to 3 in. (300mm to 75mm) |
| Gravel | 3 in. to #4 sieve (75mm to 4.75 mm) |
| Sand | #4 to #200 sieve (4.75mm to 0.075mm) |
| Silt or Clay | Passing #200 sieve (0.075mm) |

RELATIVE PROPORTIONS OF FINES

| Descriptive Term(s) of other constituents | Percent of Dry Weight |
|---|-----------------------|
| Trace | < 5 |
| With | 5 - 12 |
| Modifier | > 12 |

PLASTICITY DESCRIPTION

| Term | Plasticity Index |
|-------------|------------------|
| Non-plastic | 0 |
| Low | 1 - 10 |
| Medium | 11 - 30 |
| High | > 30 |

CPT GENERAL NOTES

DESCRIPTION OF MEASUREMENTS AND CALIBRATIONS

To be reported per ASTM D5778:

Uncorrected Tip Resistance, q_c
Measured force acting on the cone divided by the cone's projected area

Corrected Tip Resistance, q_t
Cone resistance corrected for porewater and net area ratio effects
 $q_t = q_c + U2(1 - a)$

Where a is the net area ratio, a lab calibration of the cone typically between 0.70 and 0.85

Pore Pressure, U1/U2
Pore pressure generated during penetration
U1 - sensor on the face of the cone
U2 - sensor on the shoulder (more common)

Sleeve Friction, f_s
Frictional force acting on the sleeve divided by its surface area

Normalized Friction Ratio, FR
The ratio as a percentage of f_s to q_t , accounting for overburden pressure

To be reported per ASTM D7400, if collected:

Shear Wave Velocity, V_s
Measured in a Seismic CPT and provides direct measure of soil stiffness

DESCRIPTION OF GEOTECHNICAL CORRELATIONS

Normalized Tip Resistance, Q_t
 $Q_t = (q_t - \sigma_{v0}) / \sigma'_{v0}$

Over Consolidation Ratio, OCR
OCR (1) = $0.25(Q_t)^{1.25}$
OCR (2) = $0.33(Q_t)$

Undrained Shear Strength, S_u
 $S_u = Q_t \times \sigma'_{v0} / N_{60}$
 N_{60} is a geographical factor (shown on S_u plot)

Sensitivity, St

$$St = (q_t - \sigma_{v0} / N_{60}) \times (1 / fs)$$

Effective Friction Angle, ϕ'
 $\phi' (1) = \tan^{-1}(0.373[\log(q_t / \sigma'_{v0}) + 0.29])$
 $\phi' (2) = 17.6 + 11[\log(Q_t)]$

Unit Weight
 $UW = (0.27[\log(FR)] + 0.36[\log(q_t / atm)] + 1.236) \times UW_{water}$
 σ_{v0} is taken as the incremental sum of the unit weights

SPT N_{60}
 $N_{60} = (q_t / atm) / 10^{(1.1268 - 0.2817k)}$

Soil Behavior Type Index, I_c
 $I_c = [(3.47 - \log(Q_t))^2 + (\log(FR) + 1.22)^2]^{0.5}$

Small Strain Modulus, G_0
 $G_0 = \rho V_s^2$

Elastic Modulus, E_s (assumes $q/q_{ultimate} \sim 0.3$, i.e. FS = 3)
 $E_s (1) = 2.6\psi G_0$
where $\psi = 0.56 - 0.33\log Q_{t, \text{clean sand}}$
 $E_s (2) = G_0$
 $E_s (3) = 0.015 \times 10^{(0.55I_c + 1.68)} (q_t - \sigma_{v0})$
 $E_s (4) = 2.5q_t$

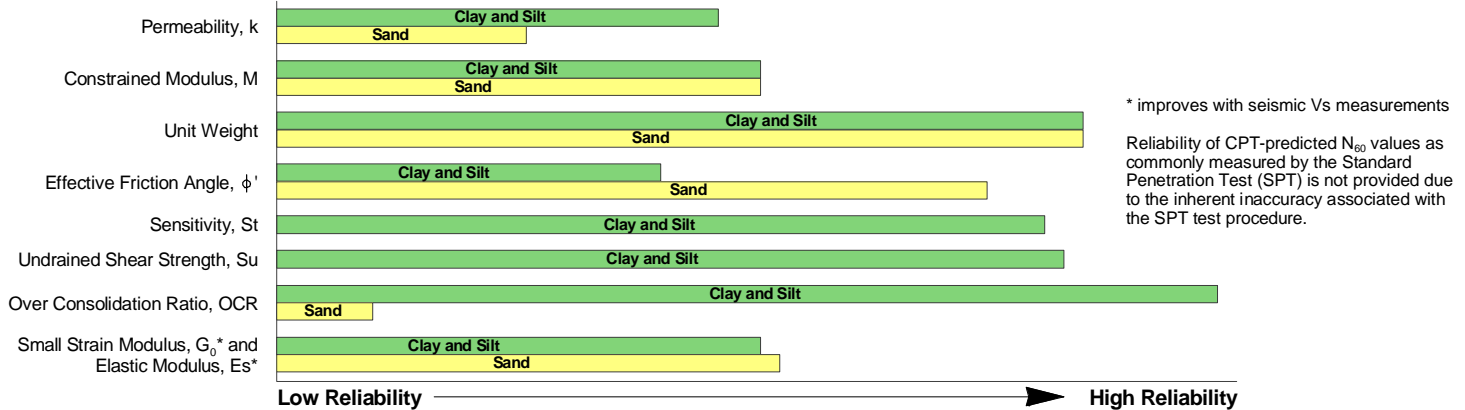
Constrained Modulus, M
 $M = \alpha_M (q_t - \sigma_{v0})$
For $I_c > 2.2$ (fine-grained soils)
 $\alpha_M = Q_t$ with maximum of 14
For $I_c < 2.2$ (coarse-grained soils)
 $\alpha_M = 0.0188 \times 10^{(0.55I_c + 1.68)}$

Hydraulic Conductivity, k
For $1.0 < I_c < 3.27$ $k = 10^{(0.952 - 3.04k)}$
For $3.27 < I_c < 4.0$ $k = 10^{(-4.52 - 1.37k)}$

REPORTED PARAMETERS

CPT logs as provided, at a minimum, report the data as required by ASTM D5778 and ASTM D7400 (if applicable). This minimum data include tip resistance, sleeve resistance, and porewater pressure. Other correlated parameters may also be provided. These other correlated parameters are interpretations of the measured data based upon published and reliable references, but they do not necessarily represent the actual values that would be derived from direct testing to determine the various parameters. The following chart illustrates estimates of reliability associated with correlated parameters based upon the literature referenced below.

RELATIVE RELIABILITY OF CPT CORRELATIONS



WATER LEVEL

The groundwater level at the CPT location is used to normalize the measurements for vertical overburden pressures and as a result influences the normalized soil behavior type classification and correlated soil parameters. The water level may either be "measured" or "estimated."

Measured - Depth to water directly measured in the field

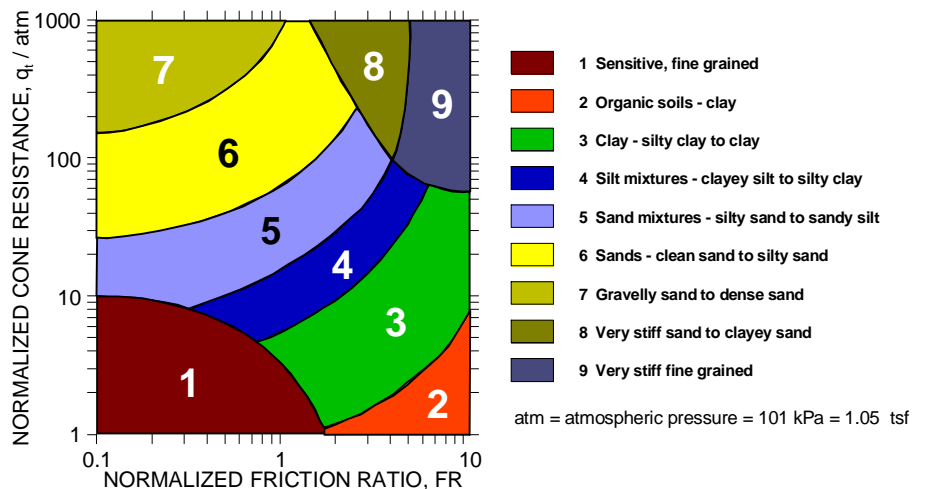
Estimated - Depth to water interpolated by the practitioner using pore pressure measurements in coarse grained soils and known site conditions

While groundwater levels displayed as "measured" more accurately represent site conditions at the time of testing than those "estimated," in either case the groundwater should be further defined prior to construction as groundwater level variations will occur over time.

CONE PENETRATION SOIL BEHAVIOR TYPE

The estimated stratigraphic profiles included in the CPT logs are based on relationships between corrected tip resistance (q_t), friction resistance (f_s), and porewater pressure (U2). The normalized friction ratio (FR) is used to classify the soil behavior type.

Typically, silts and clays have high FR values and generate large excess penetration porewater pressures; sands have lower FRs and do not generate excess penetration porewater pressures. Negative pore pressure measurements are indicative of fissured fine-grained material. The adjacent graph (Robertson et al.) presents the soil behavior type correlation used for the logs. This normalized SBT chart, generally considered the most reliable, does not use pore pressure to determine SBT due to its lack of repeatability in onshore CPTs.



REFERENCES

- Kulhavy, F.H., Mayne, P.W., (1997). "Manual on Estimating Soil Properties for Foundation Design," Electric Power Research Institute, Palo Alto, CA.
- Mayne, P.W., (2013). "Geotechnical Site Exploration in the Year 2013," Georgia Institute of Technology, Atlanta, GA.
- Robertson, P.K., Cabal, K.L. (2012). "Guide to Cone Penetration Testing for Geotechnical Engineering," Signal Hill, CA.
- Schmertmann, J.H., (1970). "Static Cone to Compute Static Settlement over Sand," *Journal of the Soil Mechanics and Foundations Division*, 96(SM3), 1011-1043.

SECTION 00 31 43 - PERMIT APPLICATION

1.1 PERMIT APPLICATION INFORMATION

- 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 the Bidders' own investigations. This Document and its attachments are not part of the Contract Documents.
- B. Permit Application: Complete the Notice of Asbestos Demolition and file with authorities having jurisdiction within five days of the Notice to Proceed.
- C. A Demolition Permit application has been filed with the Garden City Building Department. Coordinate displaying permit on site.
- D. Permits other than the Garden City Demolition Permit must be obtained and paid for within base bid.

END OF SECTION 00 31 43

SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. Work covered by Contract Documents.
3. Work under Owner's separate contracts.
4. Project Schedule
5. Work restrictions.
6. Specification and Drawing conventions.
7. Miscellaneous provisions.

B. Related Requirements:

1. Section 01 50 00 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.
2. Section 01 73 00 "Execution" for coordination of Owner-installed products.

C. Stipulation Regarding Specifications:

1. All provisions in the Project Manuals (specifications) are in addition to the provisions in the Construction Contract Between Contractor and Owner. No provisions in these specifications shall be construed to negate or diminish any requirements in the Construction Contract but shall be applicable in addition to those requirements. In the event that any provision in the Project Manual conflicts with a provision on the Construction Contract, the provision which is more stringent to the Bidder or Contractor shall prevail. The determination of stringency shall consider but shall not be limited to the following constraints and requirements: performance, materials, labor, equipment, insurance, liability, documentation, verification, approval, time, and money; in all cases, where money is a factor, it shall be considered primary.

1.3 DEFINITIONS

- A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

- B. Products: The word “products” shall be used to also define or establish all similar descriptive words, such as “components”, “items”, “systems”, and “equipment”. In the event that requirements within the reference material listed in Section 01, “References” conflict with requirements within the Contract Documents, the more stringent (measured in dollars) of requirements shall prevail, unless or until clarified or addressed otherwise, such as by RFI or DSI. In the event that the requirements of a particular product specified conflicts with other requirements within the Contract Documents, the more stringent (measured in dollars) of requirements shall prevail, unless or until clarified or addressed otherwise, such as by RFI or DSI.

1.4 PROJECT INFORMATION

- A. Project Identification: C23-17 Athletic Fields & Fieldhouse.
1. Project Location: 101 & 160 Priscilla D. Thomas Way, Garden City, Georgia 31408.
- B. Owner: Savannah Chatham County Public School System (SCCPSS).
1. Owner Location: 208 Bull Street, Savannah, Georgia 31401.
- C. Design Professional: LS3P Associates Ltd..
1. Design Professional Location: 321 West Congress Street, Savannah, Georgia 31401.
- D. Design Professional's Consultants: Design Professional has retained the following design professionals, who have prepared designated portions of the Contract Documents:
1. Civil Engineering: Moffatt & Nichol, Inc.
 - a. Moffatt & Nichol, Inc. Representative: Jamie N. Gwaltney, P.E.
 2. Landscape Architecture: CLH design, pa
 - a. CLH design, pa Representative: Christine L. Hilt, FASLA, PLA, LEED AP
 3. Structural Engineering: Tharpe Engineering Group, LLC
 - a. Tharpe Engineering Group, LLC Representative: M. Cody Tharpe, P.E.
 - b.
 4. Stadium & Athletic Field Design: CHA Consulting, Inc.
 - a. CHA Consulting, Inc. Representative: Edward J. O’Hara
 5. Fire Protection, Plumbing, Mechanical and Electrical Engineering: Duloherly Weeks Engineers
 - a. Duloherly Weeks Engineers Representative: Trevor A. McLean, P.E., LEED AP BD+C, CEM, CxA

1.5 SPECIAL INSTRUCTIONS TO BIDDERS

- A. All bidders are instructed that communications pertaining to this Project shall be as follows:
1. Pre-Award: SCCPSS Purchasing Department
 2. Post-Award: SCCPSS Facilities Construction Department and LS3P Associates Ltd.
- B. All pre-award communications must be only with the SCCPSS Purchasing Department. Any bidder who seeks to have communications regarding the Project with any other SCCPSS department or the Program Manager or Design Professional or Consultants prior to the announcement of an intended award may be disqualified.

1.6 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following:
1. A new Fieldhouse with grandstands, athletic field, track and support buildings. New athletic fields for baseball and softball with support buildings along with other site work to be constructed on the existing Groves High School campus, existing Garden City Recreation Department and other Work indicated in the Contract Documents.
- B. Type of Contract:
1. Project will be constructed under a fixed-price single prime contract between the Owner and the Contractor.
- C. Contract Documents:
1. Construction Contract between Owner and Contractor: The Construction Contract Form is that noted with revisions.
 2. Bid Form and all Addenda: The Bid Form will be as issued by the SCCPSS Purchasing Department. All addenda will be as dated when issued.
 3. Project Manuals (specifications) and Construction Drawings.
- D. Bidding:
1. Performance and Payment Bonds will be required.

1.7 USE OF PREMISES

- A. General: The Contractor shall have full use of the premises for construction operations, including use of the Project site, during the construction period. The Contractor's use of the premises is limited only by the Owner's right to perform the Work or to retain other Contractors on portions of the Project. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

- B. Use of Site: Limit use of premises to areas within the Contract limited indicated. Do not disturb portions of the Project side beyond areas in which the Work is indicated.
1. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to the Owner, Owner's employees, and emergency vehicles at all times. Do not disturb these areas for parking or storage of materials. Exceptions may be authorized if requested.

1.8 WORK UNDER OWNER'S SEPARATE CONTRACTS

- A. Work with Separate Contractors: Cooperate fully with Owner's 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 Owner's separate contracts.

1.9 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: The Contractor shall staff the Project with manpower sufficient to complete the Work no later than the required Material Completion date while performing the Work during work hours viewed as acceptable by local authorities Monday through Saturday. Exceptions may be requested in writing. The Contractor shall observe the reasonable needs of nearby properties for quiet and minimized activity at certain times.
1. Weekend Hours: Except as required by the construction schedule, and as approved in advance by the Design Professional, do not work on Sundays. Any work done on Sundays must be non-disruptive to other facilities on the property and nearby properties, which includes consideration of noise levels..
 2. Early Morning and Nighttime Hours: As indicated above, and as limited by regulations and by authorities having jurisdiction for restrictions of noise levels.
- 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 arranging for temporary utility services according to requirements indicated:
1. Notify Design Professional not less than 5 days in advance of proposed utility interruptions.
 2. Obtain Design Professional's written permission before proceeding with utility interruptions, and only with all required authorization including permits that may be required by authorities having jurisdiction
- D. Noise, Vibration, Dust, and Odors: Coordinate operations that may result in high levels of noise and vibration, dust, odors, or other disruption to Owner occupancy with Owner.

1. Notify Design Professional not less than 5 days in advance of proposed disruptive operations.
 2. Obtain Design Professional's written permission before proceeding with disruptive operations.
- E. Smoking and Controlled Substance Restrictions: Use of tobacco products, alcoholic beverages, and other controlled substances on Project site and on Owner's property is not permitted.

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. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
 4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings and published as part of the U.S. National CAD Standard.
 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.11 MISCELLANEOUS PROVISIONS

- A. All Work shall be done in strict accordance with the product manufacturer's instructions, where applicable, and in accordance with practices and standards acceptable to the Design Professional. For products for which no Specification Section reference is made, the Work shall be executed according to Section 01 73 00 "Execution", as well as all applicable portions of related Specification Sections. In the event that requirements within the reference material listed in Section 01, "References" conflict with requirements within the Contract Documents, the

more stringent (measured in dollars) of requirements shall prevail, unless or until clarified or addressed otherwise, such as by RFI or DSI. In the event that the requirements of a particular product specified conflicts with other requirements within the Contract Documents, the more stringent (measured in dollars) of requirements shall prevail, unless or until clarified or addressed otherwise, such as by RFI or DSI.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

SECTION 01 21 00 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements governing allowances.
- B. Types of allowances include the following:
 - 1. Lump-sum allowances.
- C. Related Requirements:
 - 1. Section 01 22 00 "Unit Prices" for procedures for using unit prices, including adjustment of quantity allowances when applicable.
 - 2. Section 01 26 00 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.3 DEFINITIONS

- A. Allowance: A quantity of work or dollar amount included in the Contract, established in lieu of additional requirements, used to defer selection of actual materials and equipment to a later date when direction will be provided to Contractor. If necessary, additional requirements will be issued by Change Order.

1.4 SELECTION AND PURCHASE

- A. At Design Professional's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- B. Purchase products and systems selected by Design Professional from the designated supplier.

1.5 ACTION SUBMITTALS

- A. Submit proposals for purchase of products or systems included in allowances in the form specified for Change Orders.

1.6 INFORMATIONAL SUBMITTALS

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.7 LUMP-SUM ALLOWANCES

- A. Allowance shall include cost to Contractor of specific products and materials ordered by Owner or selected by Design Professional under allowance and shall include taxes, freight and delivery to Project site.
- B. Unless otherwise indicated, Contractor's costs for receiving and handling at Project site, labor, installation, overhead and profit, and similar costs related to products and materials ordered by Owner or selected by Design Professional under allowance shall be included as part of the Contract Sum and not part of the allowance.
- C. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
 - 1. If requested by Design Professional, retain and prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Design Professional, deliver unused material to Owner's storage space as directed. Otherwise, disposal of unused material is Contractor's responsibility.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

3.2 PREPARATION

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

- A. Lump sum allowance of \$300,000 for unforeseen conditions related to sitework and underground utilities.
- B. Lump sum allowance of \$30,000 for all residential appliances as specified in Section 11 30 13 – RESIDENTIAL APPLIANCES.
- C. Lump sum allowance of \$100,000 for Monumental Sign to be located at the Northeast corner of PDTW and HWY 21.

END OF SECTION 01 21 00

SECTION 01 22 00 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for unit prices.
- B. Related Requirements:
 - 1. Section 01 26 00 "Contract Modification Procedures" for procedures for submitting and handling Change Orders.
 - 2. Section 01 40 00 "Quality Requirements" for field testing by an independent testing agency.

1.3 DEFINITIONS

- A. Unit price is a total amount incorporated into the Base Bid and shall be used during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. The derivation of all Unit Prices, including any presented as a part of the Contractor's Bid, shall be done in strict accordance with Section 01 26 00, "Contract Modifications And Procedures", and all requirements within said Section shall apply in full to Unit Prices. The Owner reserves

the right to reject one or all of the Contractor's Unit Prices and require that the Contractor prepare a Unit Price that is in accordance with this requirement.

- E. All Unit Prices shall be derived based on the premise that the quantity used, if any, will be of a count sufficient to support and economy of scale. With each Unit Price submitted, the Contractor may provide a minimum quantity, under which the Contractor may appeal to the Design Professional and Owner for an increased unit price amount. When the quantity of units is below the minimum quantity stipulated, and a reasonable adjustment is supported and justified, it may be approved by the Design Professional and Owner.
- F. The performance of Unit Price Work shall not increase the Contract Time, unless demonstrated by the Contractor to cause an increase and approved by the Design Professional and Owner.
- G. List of Unit Prices: A schedule of unit prices is included in Part 3. Specification Sections referenced in the Part 3 "Schedule of Unit Prices" Article contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF UNIT PRICES

- A. In accordance with applicable Drawings and Specifications, provide Unit Prices to add or delete quantities of the following scheduled items:
 - 1. Provide unit price per cubic yard of excavated unsuitable soils off haul.
 - a. Cost shall include excavation, load, haul-off and proper disposal. Allow for additional mobilizing and demobilizing, as the total quantity will not be performed at a mobilized area and may be in small / trench areas.
 - 2. Provide unit price per cubic yard of structural infill delivered and placed.
 - a. Cost shall include purchase, hauling, testing of soil and compact. Allow for additional mobilizing and demobilizing, as the total quantity will not be performed at a mobilized area and may be in small / trench areas.
 - 3. Provide unit price per linear foot of sub-grade drains.
 - a. Cost shall include pipe purchase and install.
 - 4. Provide unit price per cubic yard of additional light duty (33.5" deep) cut for the pavement sections.

- a. Cost shall include excavation, load, haul-off and proper disposal. Allow for additional mobilizing and demobilizing, as the total quantity will not be performed at a mobilized area and may be in small / trench areas.
5. Provide unit price per cubic yard of additional heavy duty (35" deep) cut for the pavement sections.
 - a. Cost shall include excavation, load, haul-off and proper disposal. Allow for additional mobilizing and demobilizing, as the total quantity will not be performed at a mobilized area and may be in small / trench areas.

3.2 END OF SECTION 01 22 00

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 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 the 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.

1.4 PROCEDURES

- A. Coordination: Revise 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 alternative. Indicate if alternatives have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions or 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. 1 (add): Panel Sign.

1. Base Bid: Provide Panel sign from one of the listed manufactures.
2. Alternate: Provide Panel sign as manufactured by “Daktronics – Galaxy”.

B. Alternate No. 2 (add): Fieldhouse Drive.

1. Base Bid: Provide base bid for light duty asphalt pavement section for the Fieldhouse drive, which consist of 24 inches of select fill, 7 inches of compacted granite aggregate base course, and 2 inches of asphaltic concrete DOT type 12.55 mm.
2. Alternate: Provide an alternative for heavy duty concrete pavement section for the Fieldhouse drive, which consists of 24 inches of fill, 4 inches of comparted granite aggregate base course, and 7 inches of Portland cement concrete.

C. Alternate No. 3 (add): HVAC Equipment.

1. Base Bid: Provide base bid for equipment from one of the listed manufactures.
2. Alternate: Provide a separate line in the bid package to provide *Daikin* equipment for the following specification sections:
 - a. 235310 Air Conditioners
 - b. 236110 Heat Pumps
 - c. 236310 VRF Heat Pumps
 - d. 237110 Dedicated Outdoor Air Systems
 - e. 237210 Energy Recovery Ventilators

D. Alternate No. 4 (add): School Zone on Highway 21.

1. Base Bid: Provide no work associated with the School Zone along HWY 21.
2. Alternate: Provide complete scope of work for School Zone along HWY 21 per specifications and drawings.

E. Alternate No. 5 (add): Pedestrian Entrance at Byck Avenue.

1. Base Bid: Provide no work associated with pedestrian access from Byck Avenue.
2. Alternate: Provide complete scope of work to provide pedestrian access from Byck Avenue onto K-12 site as shown on drawings.

END OF SECTION 01 23 00

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
 - 1. Section 01 21 00 "Allowances" for products selected under an allowance.
 - 2. Section 01 23 00 "Alternates" for products selected under an alternate.
 - 3. Section 01 60 00 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.3 DEFINITIONS

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents.
 - 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 to meet other Project requirements but may offer advantage to Contractor or Owner.

1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit documentation identifying product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI form 13.1A.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation method cannot be provided, if applicable.

- b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, 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 as well as names and addresses of design professionals 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 a model code organization acceptable to authorities having jurisdiction.
 - j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
 - k. Cost information, including a proposal of change, if any, in the Contract Sum.
 - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
 - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Design Professional's Action prior to bid: If necessary, Design Professional will request additional information or documentation for evaluation within twelve days prior to bid for substitution. Design Professional will notify Contractor of acceptance or rejection of proposed substitution by Addendum only.
 4. Design Professional's Action post-bid: Design Professional will not accept additional information or documentation for substitutions after bid opening.

1.5 QUALITY ASSURANCE

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

1.6 PROCEDURES

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

1.7 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 12 days prior to bid opening.

1. Conditions: Design Professional will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Design Professional 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.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

SECTION 01 26 00 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Requirements:
 - 1. Section 01 25 00 "Substitution Procedures" for administrative procedures for handling requests for substitutions made after the Contract award.
 - 2. Section 01 31 00 "Project Management and Coordination" for requirements for forms for contract modifications provided as part of web-based Project management software.

1.3 MINOR CHANGES IN THE WORK

- A. Supplemental Instruction: The Design Professional may issue a "Design Professional's Supplemental Instruction" or "DSI", which is a supplemental instruction authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time. Each DSI will be numbered and dated, and subsequent communications regarding each DSI should give reference to the DSI number and date. DSIs when issued become a part of the Contract Documents, and as such must be adhered to. The effects of DSIs must be reflected in the Project Record Documents. Each DSI issued shall bear words addressed by the Design Professional to the Contractor: "The work is to be carried out according to the following instructions, issued in accordance with the Contract Documents without change in the Contract Sum or Contract Time, the Contractor shall notify the Design Professional immediately, prior to proceeding with the Work in accordance with this Supplemental Instruction. Proceeding with the Work in accordance with this Supplemental Instruction without prior notification otherwise to the Design Professional indicates the Contractor's acknowledgement that there will be no change in the Contract Sum or Contract Time".
- B. Response to Inquiry: The Design Professional will issue a written RFI Response to each written Contractor inquiry. (All Contractor inquiries shall come in the form of an RFI – see Section 01 31 00 "Project Management and Coordination") Unless specifically addressed, RFIs and RFI Responses shall not involve any adjustment to the Contract Sum or Contract Time. RFI Responses when issued become part of the Contract Documents, and as such must be adhered to. The effects of RFI Responses must be reflected in the Project Record Documents. Each RFI Response shall bear words addressed by the Design Professional to the Contractor: "The work is

to be carried out according to the following instructions or clarifications issued in response to Request For Information #(enter RFI#), and in accordance with the Contract Documents without change in the Contract Sum or Contract Time. If it is determined that this response does affect the Contract Sum or Contract Time, the Contractor shall notify the Design Professional immediately, and shall do so prior to proceeding with the Work in accordance with this response. Proceeding with the Work in accordance with this Supplemental Instruction without prior notification otherwise to the Design Professional indicates the Contractor's acknowledgement that there will be no change in the Contract Sum or Contract Time".

1.4 CHANGES IN THE WORK AFFECTING COST AND/OR TIME

- A. Proposal Requests: The Design Professional (or Owner) may issue a "Work Change Proposal Request" (WCPR), which is 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. Each WCPR will be numbered and dated, and subsequent communications regarding each WCPR should give reference to the WCPR number and date.
1. Proposal Requests are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 2. Within the time period required by the Contract or that specified in WCPR after receipt of Proposal Request, the Contractor shall submit a Change Order Proposal (COP), which is a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change. Each COP must give reference to the number and date of the WCPR to which it is in response.
 - 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. If affected, the Contractor's Construction Schedule shall be updated to indicate the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. This updated schedule shall be submitted with the COP. Use available total float before requesting an extension of the Contract Time. By omission of an updated Schedule as a part of a COP, the Contractor shall and does establish that the Schedule is not affected by the subject change. Any COP that proposes to affect Contract Time may be considered non-responsive if it does not include an updated Schedule.
- B. Contractor-Initiated Proposals: If in the opinion of the Contractor latent or unforeseen conditions require modifications to the Contract, the Contractor may propose changes by submitting a "Request for Change" (RFC) to Design Professional. Each RFC should be numbered and dated, and subsequent communications regarding each RFC should give reference to the RFC number and date.

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. If affected, the Contractor's Construction Schedule shall be updated to indicate the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. This updated schedule shall be submitted with the COP. Use available total float before requesting an extension of the Contract Time. By omission of an updated Schedule as a part of an RFC, the Contractor shall and does establish that the Schedule is not affected by the subject change. Any RFC that proposes to affect Contract Time must include an updated Schedule.
 6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
- C. All change proposals shall include complete break-out and support documentation, including unit descriptions, unit quantities, unit costs (labor, material, other), burdens and mark-ups. Portions of work that are to be deleted as a part of an overall change description shall be clearly reflected in the break-out; abbreviated descriptions which reflect only the net effects of reduced work scopes combined with increased work scopes will not be accepted. The Design Professional and Owner shall have full discretion in determining what measure of breakout and support is adequate and acceptable. No extension of Contract Time will be allowed for Construction delays attributable to the failure on the part of the Contractor to provide properly prepared and supported change proposals.
- D. Proposal and change request forms: Use forms that are acceptable to the Design Professional and Owner. If the Design Professional or Owner deems it necessary, the Contractor shall be required and shall agree to submit change proposals on forms provided by the Design Professional or Owner, completed fully.
- E. Do not reflect any Change Order in the Schedule of Values or Application for Payment Continuation without the prior approval of the Design Professional or Owner. The Design Professional or Owner shall have full discretion in establishing the manner in which Change Orders are added to the Schedule of Values and Continuation Sheets
- 1.5 ALLOWANCE
- A. Allowance Adjustment: All charges against an Allowance shall be made in the form of a CO resulting from a COP or RFC, shall be managed as any CO, and shall be invoiced against the Allowance line item in the Application for Payment. At Project completion, or sooner as may be directed by the Owner, any unused balance in each allowance will be returned to the Owner by deductive CO.

- B. Where applicable, submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 14 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 14 days after such authorization.
1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
 2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

1.6 CHANGE ORDER PROCEDURES

- A. The Design Professional shall immediately upon receipt review each Change Order Proposal (COP) and Request for Change (RFC) for its technical and monetary merits. The Design Professional will not forward to the Owner any advice or recommendation for any COP or RFC that does not meet all requirements stipulated herein these Contract Documents, but shall instead return it to the Contractor with specific instructions as to what must be done in order to rectify the problems with the COP or RFC. The Design Professional will provide written advice to the Owner regarding his opinion of each COP or RFC, which will include a recommendation regarding each.
- B. Upon Owner's approval of a Change Order Proposal (COP) or Request for Change (RFC), Design Professional will issue a Change Order for signatures of Contractor and Owner.

1.7 FORCE ACCOUNT CHANGE DIRECTIVE

- A. A. Force Account: Force Account work shall be undertaken only after receipt of an Approved Change Order, stating a maximum dollar amount (Stipulated Maximum Sum) beyond which no change work may be undertaken subject to amendment, for funding all costs of the Change Order as prescribed in Article 3.2.7.3 of the Contract.
- B. Documentation: The Contractor shall maintain detailed records on a time and material basis of work required by the Force Account Change Order.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.8 TRACKING, COORDINATION AND MANAGEMENT OF CLARIFICATIONS AND CHANGES

- A. Some clarifications and changes will go thru a process whereby they are assigned tracking numbers as more than one of the type documents defined in the articles above and in other Sections of these Specifications (i.e. RFIs, etc.). All documents created which pertain to the same subject shall make clear reference to other previous or concurrent documents on the subject.

1. The Contractor shall establish and maintain current a single Log which tracks all these type documents. The form and content of this log is subject to Design Professional and Owner approval and may if sufficient be used to meet other stipulated tracking log requirements.

1.9 DELAYS AND EXTENSIONS OF TIME DUE TO WEATHER

- A. Delays caused by weather are non-compensable and will be processed in accordance with Article 3.3.7.2 of the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

SECTION 01 29 00 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Requirements:
 - 1. Section 01 21 00 "Allowances" for procedural requirements governing the handling and processing of allowances.
 - 2. Section 01 22 00 "Unit Prices" for administrative requirements governing the use of unit prices.
 - 3. Section 01 26 00 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
 - 4. Section 01 32 00 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
 - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
 - 2. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including Application for Payment forms with Continuation Sheets, Submittal Schedule, and Contractor's Construction Schedule.
 - 3. Submit the schedule of values to Design Professional at earliest possible date, but no later than 14 days after the issuance of the first Proceed Order. The Schedule of Values must precede and be approved by the Design Professional and Owner prior to the initial

- Application for Payment. The initial or any Application for Payment submitted which is not in accordance with the Schedule of Value approved in advance by the Design Professional and Owner will be returned without action. There will be no exceptions.
4. The Design Professional and Owner have full discretion in establishing the measures and depth of breakout
 5. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values coordinated with each phase of payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Owner's name.
 - c. Name of Design Professional.
 - d. Design Professional's Project number.
 - e. Contractor's name and address.
 - f. Date of submittal.
 2. Arrange schedule of values consistent with format of AIA Document G703. Submit draft Application for Payment Continuation Sheets.
 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide multiple line items for principal subcontract amounts in excess of five percent of the Contract Sum.
 4. Coordinate with the Project Manual table of contents. The approved Schedule of Values shall be used in the Continuation Sheets of all Applications for Payment and shall not be altered except by the addition of approved Change Orders. Alterations to the approved line items in an Application for Payment without prior agreement will result in the return of the Application for Payment to the Contractor, with no action. There will be no exceptions.
 5. The total of the line items in the Schedule of Values shall equal the Contract Sum.
 6. 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.
 7. Overhead Costs, Separate Line Items: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
 8. Temporary Facilities: Show cost of temporary facilities and other major cost items that are not direct cost of actual work-in-place as separate line items.
 9. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
 10. Each item in the Schedule of Values and Applications for Payment shall be complete.
 11. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments, as certified by Design Professional and paid for by Owner.
- B. Payment Application Times: Submit Application for Payment to Design Professional by the last of the month. The period covered by each Application for Payment is one month, ending on the last day of the month.
1. Submit draft copy of Application for Payment seven days prior to due date for review by Design Professional.
- 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. Design Professional 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. Add Change Orders and Force Account Change Directives to the Schedule of Values and Continuation Sheets in a manner that accurately reflects the manner in which they are authorized and issued.
- 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. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
 - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
 - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.

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- F. Transmittal: Submit four signed and notarized original copies of each Application for Payment to Design Professional 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 and Design Professional reserves the right to designate which entities involved in the Work must submit waivers.
 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
 6. All Applications for Payment involve additional required actions and submittals. Any Application for Payment submitted without compliance with every one of these additional requirements will be returned without action. Actions and submittals that are completed, but not in accordance with the requirements of the Contract Documents, will be counted as not submitted and will be returned without action along with the Application for Payment. Reasonable exceptions to these required actions and submittals, such as for items which are not applicable, will be considered, but only if presented for consideration in written form and only if presented within the time frame stipulated for the requirement for which the exception is sought. If the requested exception is not approved by the Design Professional, notification of this will be provided to the Contractor no later than along with the Application for Payment when it is returned without action. Subject to the possible deletion of certain of the items in the list that follow during the Pre-Construction Conference, actions and submittals which are required with Applications for Payments are the Initial Application for Payment, Periodic Applications for Payment, Application for Payment at Material Completion, and the Final Application Payment.
- H. 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. Submittal schedule (preliminary if not final).
 5. List of Contractor's staff assignments.
 6. List of Contractor's principal consultants.
 7. Copies of building permits.
 8. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.

9. Initial progress report.
 10. Report of preconstruction conference.
 11. Certificates of insurance and insurance policies.
 12. Performance and payment bonds.
 13. Daily construction reports for the period covered by the Application.
 14. Minutes of all meetings held during the period covered by the Application.
 15. Updated current RFI. ASI. WCPR, COP (and RFC) and CO logs.
 16. All actual submittals and approvals of all items that require approval prior to commencement of work for which payment is sought.
- I. Periodic Applications for Payment: Administrative actions and submittals that must precede or coincide with submittal of each Periodic Application for Payment include the following:
1. Contractor's updated schedule, or a written statement that the most recent previous updated schedule remains accurate within 5%, which statement shall be subject to the concurrence of the Design Professional.
 2. Updated current Submittal Schedule and Log.
 3. Daily construction reports for the period covered by the Application.
 4. Minutes of all meetings held during the period covered by the Application.
 5. Updated current RFI. ASI. WCPR, COP (and RFC) and CO logs.
 6. All actual submittals and approvals of all items that require approval prior to commencement of work for which payment is sought.
- J. Application for Payment at Material Completion: Administrative actions and submittals that must precede or coincide with the submittal of each Application for Payment at Material Completion include those in the following list. After Design Professional issues the Certificate of Material 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.
 - a. Complete administrative actions, submittals, and Work preceding this application, as described in Section 01 77 00 "Closeout Procedures."
 2. This application shall reflect Certificate(s) of Material Completion issued previously for Owner occupancy of designated portions of the Work.
 3. Contractor's final updated construction schedule, which shall indicate an accurate record of the actual construction schedule as it occurred.
 4. Written statement that all required extra materials, parts, keys and tools have been transmitted and properly stored, including a list accounting for all such items and quantities transmitted.
 5. Daily construction reports for the period covered by the Application.
 6. Minutes of all meetings held during the period covered by the Application.
 7. Updated current RFI. ASI. WCPR, COP (and RFC) and CO logs.
- K. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
 2. Certification of completion of final punch list items.
 3. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 4. Updated final statement, accounting for final changes to the Contract Sum.
 5. AIA Document G706.
 6. AIA Document G706A.
 7. AIA Document G707.
 8. Evidence that claims have been settled.
 9. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Material Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 10. Final liquidated damages settlement statement.
 11. Minutes of meeting and daily construction reports not previously submitted.
- L. If at the time an Application for Payment, based on the approved Submittal Schedule, the provision of submittals is behind schedule, based on the current approved Submittal Schedule, the Contractor shall not be allowed to request funds for General Conditions, which, if requested, will cause the Application to be returned without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 29 00

SECTION 01 31 00 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project, including, but not limited to, the following:
 - 1. General coordination procedures.
 - 2. Coordination drawings.
 - 3. RFIs.
 - 4. Digital project management procedures.
 - 5. Web-based Project management software package.
 - 6. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.
- C. Related Requirements:
 - 1. Section 01 32 00 "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
 - 2. Section 01 73 00 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
 - 3. Section 01 77 00 "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

- A. BIM: Building Information Modeling.
- B. RFI: Request for Information. Request from Owner, Design Professional, or Contractor seeking information required by or clarifications of the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. 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. Include the following information in tabular form:

1. Name, address, telephone number, and email address 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.

B. Key Personnel Names: Within 5 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, cellular telephone numbers, and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in Project meeting room, in temporary field office, in web-based Project software directory, and in prominent location in each built facility. Keep list current at all times.

1.5 GENERAL COORDINATION PROCEDURES

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. 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.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and scheduled 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.

1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, and additionally where installation is not completely indicated 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. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
 - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
 - b. Coordinate the addition of trade-specific information to coordination drawings in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
 - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
 - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
 - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
 - f. Indicate required installation sequences.
 - g. Indicate dimensions shown on Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternative sketches to Design Professional indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Coordination Drawing Organization: Organize coordination drawings as follows:
1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
 2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within plenums to accommodate layout of light fixtures and other components indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms, showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
 6. Mechanical and Plumbing Work: Show the following:

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- a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
 - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
 - c. Fire-rated enclosures around ductwork.
7. Electrical Work: Show the following:
 - a. Runs of vertical and horizontal conduit 1-1/4 inches in diameter and larger.
 - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
 - c. Panel board, switchboard, switchgear, transformer, busway, generator, and motor-control center locations.
 - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
 8. Fire-Protection System: Show the following:
 - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
 9. Review: Design Professional will review coordination drawings to confirm that, in general, the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Design Professional determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Design Professional will so inform Contractor, who shall make suitable modifications and resubmit.
 10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Section 01 33 00 "Submittal Procedures."
- C. Coordination Drawing Process: Prepare coordination drawings in the following manner:
1. Schedule submittal and review of Fire Sprinkler, Plumbing, HVAC, and Electrical Shop Drawings to make required changes prior to preparation of coordination drawings.
 2. Commence routing of coordination drawing files with HVAC Installer, who will provide drawing plan files denoting approved ductwork. HVAC Installer will locate ductwork and piping on a single layer, using orange color. Forward drawings to Plumbing Installer.
 3. Plumbing Installer will locate plumbing and equipment on a single layer, using blue color.
 4. Fire Sprinkler Installer will locate piping and equipment, using red color. Fire Sprinkler Installer shall forward drawing files to Electrical Installer.
 5. Electrical Installer will indicate service and feeder conduit runs and equipment in green color. Electrical Installer shall forward drawing files to Communications and Electronic Safety and Security Installer.
 6. Communications and Electronic Safety and Security Installer will indicate cable trays and cabling runs and equipment in purple color. Communications and Electronic Safety and Security Installer shall forward completed drawing files to Contractor.
 7. Contractor shall perform the final coordination review. As each coordination drawing is completed, Contractor will meet with Design Professional to review and resolve conflicts on the coordination drawings.

- D. Coordination Digital Data Files: Prepare coordination digital data files according to the following requirements:
1. File Preparation Format:
 - a. Same digital data software program, version, and operating system as original Drawings.
 2. File Submittal Format: Submit or post coordination drawing files using format same as file preparation format.
 3. Design Professional will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
 - a. Design Professional makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
 - b. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Design Professional.

1.7 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarification, or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Design Professional will return without response those RFIs submitted to Design Professional by other entities controlled by Contractor.
 2. Coordinate and submit RFIs in a prompt manner 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. Owner name.
 3. Name of Design Professional.
 4. Date.
 5. Name of Contractor.
 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 suggested resolution 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: Software-generated form with substantially the same content as indicated above, acceptable to Design Professional.
1. Attachments shall be electronic files in PDF format.
- D. Design Professional's Action: Design Professional will review each RFI, determine action required, and respond. Allow seven days for Design Professional's response for each RFI. RFIs received by Design Professional after 1:00 p.m. will be considered as received the following working day.
1. The following Contractor-generated RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for approval of Contractor's means and methods.
 - d. Requests for coordination information already indicated in the Contract Documents.
 - e. Requests for adjustments in the Contract Time or the Contract Sum.
 - f. Requests for interpretation of Design Professional's actions on submittals.
 - g. Incomplete RFIs or inaccurately prepared RFIs.
 2. Design Professional's action may include a request for additional information, in which case Design Professional's time for response will date from time of receipt by Design Professional of additional information.
 3. Design Professional'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 01 26 00 "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Design Professional in writing within 10 days of receipt of the RFI response.
- E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log bi-weekly. Use CSI Log Form 13.2B and include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Design Professional.
 4. RFI number, including RFIs that were returned without action or withdrawn.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Design Professional's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

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

1.8 PROJECT MEETINGS

- A. General: 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 Design Professional of scheduled meeting dates and times a minimum of seven days prior to meeting.
 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 Design Professional, within three days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Design Professional, but no later than 15 days after execution of the Agreement.
1. Attendees: Authorized representatives of Owner Design Professional, 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. Responsibilities and personnel assignments.
 - b. Tentative construction schedule.
 - c. Phasing.
 - d. Critical work sequencing and long lead items.
 - e. Designation of key personnel and their duties.
 - f. Lines of communications.
 - g. Use of web-based Project software.
 - h. Procedures for processing field decisions and Change Orders.
 - i. Procedures for RFIs.
 - j. Procedures for testing and inspecting.
 - k. Procedures for processing Applications for Payment.
 - l. Distribution of the Contract Documents.
 - m. Submittal procedures.
 - n. Preparation of Record Documents.
 - o. Use of the premises.
 - p. Work restrictions.
 - q. Working hours.
 - r. Owner's occupancy requirements.
 - s. Responsibility for temporary facilities and controls.
 - t. Procedures for moisture and mold control.
 - u. Procedures for disruptions and shutdowns.
 - v. Construction waste management and recycling.

- w. Parking availability.
 - x. Office, work, and storage areas.
 - y. First aid.
 - z. Security.
 - aa. 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 when required by other Sections and when required for 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 Design Professional 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:
 - a. Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.
 - e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility requirements.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written instructions.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. 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. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Design Professional, but no later than 90 days prior to the scheduled date of Material Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
 2. Attendees: Authorized representatives of Owner, Design Professional, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
 - a. Preparation of Record Documents.
 - b. Procedures required prior to inspection for Material Completion and for final inspection for acceptance.
 - c. Submittal of written warranties.
 - d. Requirements for preparing operations and maintenance data.
 - e. Requirements for delivery of material samples, attic stock, and spare parts.
 - f. Preparation of Contractor's punch list.
 - g. Procedures for processing Applications for Payment at Material Completion and for final payment.
 - h. Submittal procedures.
 - i. Coordination of separate contracts.
 - j. Owner's partial occupancy requirements.
 - k. Installation of Owner's furniture, fixtures, and equipment.
 - l. Responsibility for removing temporary facilities and controls.
 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- E. Progress Meetings: Conduct progress meetings at biweekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
 2. Attendees: In addition to representatives of Owner and Design Professional, 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.
 3. 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. Contractor'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 Contractor'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) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site use.
 - 8) Temporary facilities and controls.
 - 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of Proposal Requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.
4. 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.
- F. Coordination Meetings: Conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner and Design Professional, 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 meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to combined Contractor'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.
- b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting, where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site use.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 00 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's Construction Schedule.
3. Construction schedule updating reports.
4. Daily construction reports.
5. Material location reports.
6. Site condition reports.
7. Unusual event reports.

- B. Related Requirements:

1. Section 01 40 00 "Quality Requirements" for schedule of tests and inspections.
2. Section 01 29 00 "Payment Procedures" for schedule of values and requirements for use of cost-loaded schedule for Applications for Payment.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction Project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

- B. Cost Loading: The allocation of the schedule of values for completing an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum.

- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine the critical path of Project and when activities can be performed.

- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 2. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for completing an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. PDF file.
- B. Startup construction schedule.
 - 1. Submittal of cost-loaded startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.
- C. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
- D. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
 - 1. Submit a working digital copy of schedule, using software indicated, and labeled to comply with requirements for submittals.
- E. Construction Schedule Updating Reports: Submit with Applications for Payment.
- F. Daily Construction Reports: Submit at weekly intervals.
- G. Material Location Reports: Submit at weekly intervals.
- H. Site Condition Reports: Submit at time of discovery of differing conditions.
- I. Unusual Event Reports: Submit at time of unusual event.
- J. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Design Professional's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's Construction Schedule, including, but not limited to, the following:
 - 1. Review software limitations and content and format for reports.
 - 2. Verify availability of qualified personnel needed to develop and update schedule.
 - 3. Discuss constraints, including phasing, work stages, interim milestones and partial Owner occupancy.
 - 4. Review delivery dates for Owner-furnished products.
 - 5. Review schedule for work of Owner's separate contracts.
 - 6. Review submittal requirements and procedures.
 - 7. Review time required for review of submittals and resubmittals.
 - 8. Review requirements for tests and inspections by independent testing and inspecting agencies.
 - 9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
 - 10. Review and finalize list of construction activities to be included in schedule.
 - 11. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate Contractor's Construction Schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 - 1. Secure time commitments for performing critical elements of the Work from entities involved.
 - 2. Coordinate each construction activity in the network with other activities, and schedule them in proper sequence.

1.7 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.
- B. Scheduling Consultant: Engage a consultant to provide planning, evaluation, and reporting, using CPM scheduling.
 - 1. In-House Option: Owner may waive requirement to retain a consultant if Contractor employs skilled personnel with experience in CPM scheduling and reporting techniques. Submit qualifications.

2. Meetings: Scheduling consultant shall attend all meetings related to Project progress, alleged delays, and time impact.
- C. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Final Completion.
1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- D. Activities: Treat each floor or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
1. Activity Duration: Define activities so no activity is longer than 5 days, unless specifically allowed by Design Professional.
 2. Temporary Facilities: Indicate start and completion dates for the following as applicable:
 - a. Securing of approvals and permits required for performance of the Work.
 - b. Temporary facilities.
 - c. Construction of mock-ups, prototypes and samples.
 - d. Owner interfaces and furnishing of items.
 - e. Interfaces with Separate Contracts.
 - f. Regulatory agency approvals.
 - g. Punch list.
 3. Procurement Activities: Include procurement process activities for the following long lead-time items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 4. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's Construction Schedule with submittal schedule.
 5. Startup and Testing Time: Include no fewer than 10 days for startup and testing.
 6. Material Completion: Indicate completion in advance of date established for Material Completion, and allow time for Design Professional's administrative procedures necessary for certification of Material Completion.
 7. Punch List and Final Completion: Include not more than 10 days for completion of punch list items and Final Completion.
- E. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 3. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 4. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.

- b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Material Completion.
 - e. Use-of-premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
5. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
- a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Building flush-out.
 - m. Startup and placement into final use and operation.
6. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
- a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.
 - f. Material Completion.
- F. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Material Completion, and Final Completion.
- G. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
 2. Unanswered Requests for Information.
 3. Rejected or unreturned submittals.
 4. Notations on returned submittals.
 5. Pending modifications affecting the Work and the Contract Time.

- H. Contractor's Construction Schedule Updating: At bi-weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 3. As the Work progresses, indicate Final Completion percentage for each activity.
- I. Recovery Schedule: When periodic update indicates the Work is 8 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, equipment required to achieve compliance, and date by which recovery will be accomplished.
- J. Distribution: Distribute copies of approved schedule to Design Professional Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

1.8 GANTT-CHART SCHEDULE REQUIREMENTS

- A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's Construction Schedule within 10 days of date established for the Notice to Proceed.
- B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

1.9 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. Equipment at Project site.
 5. Material deliveries.

6. High and low temperatures and general weather conditions, including presence of rain or snow.
 7. Testing and inspection.
 8. Accidents.
 9. Meetings and significant decisions.
 10. Unusual events.
 11. Stoppages, delays, shortages, and losses.
 12. Meter readings and similar recordings.
 13. Emergency procedures.
 14. Orders and requests of authorities having jurisdiction.
 15. Change Orders received and implemented.
 16. Work Change Directives received and implemented.
 17. Services connected and disconnected.
 18. Equipment or system tests and startups.
 19. Partial completions and occupancies.
 20. Material Completions authorized.
- B. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
1. Material stored prior to previous report and remaining in storage.
 2. Material stored prior to previous report and since removed from storage and installed.
 3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.
- D. Unusual Event Reports: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, responses by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.
1. Submit unusual event reports directly to Owner within one day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 32 00

SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Preconstruction photographs.
 - 2. Periodic construction photographs.
- B. Related Requirements:
 - 1. Section 01 77 00 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.

1.3 INFORMATIONAL SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
- B. Digital Photographs: Submit image files within three days of taking photographs.
 - 1. Submit photos by uploading to web-based Project management software site. Include copy of key plan indicating each photograph's location and direction.
 - 2. Identification: Provide the following information with each image description in web-based Project management software site:
 - a. Name of Project.
 - b. Name and contact information for photographer.
 - c. Name of Design Professional.
 - d. Name of Contractor.
 - e. Date photograph was taken.

1.4 QUALITY ASSURANCE

- A. Photographer Qualifications: An individual who has been regularly engaged as a professional photographer of construction projects for not less than three years.

1.5 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format, produced by a digital camera with minimum sensor size of 12 megapixels, and at an image resolution of not less than 3200 by 2400 pixels. Use flash in low light levels or backlit conditions.
- B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
- C. File Names: Name media files with date, Project area and sequential numbering suffix.

1.6 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
 - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
 - 1. Flag construction limits before taking construction photographs.
 - 2. Take 20 photographs to show existing conditions adjacent to property before starting the Work.
 - 3. Take 20 photographs of existing buildings either on or adjoining property, to accurately record physical conditions at start of construction.
- C. Periodic Construction Photographs: Take 50 photographs weekly. Select vantage points to show status of construction and progress since last photographs were taken.
- D. Final Completion Construction Photographs: Take 100 photographs after date of Material Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.

1.7 CONSTRUCTION WEBCAM

- A. Webcam: Provide two fixed-location camera(s) with weatherproof housing, mounted to provide unobstructed view of construction site from location approved by Architect, with the following characteristics:
 - 1. Remotely controllable view with mouse-click user navigation for horizontal pan, vertical tilt, and optical zoom of 500 percent minimum.
 - 2. Capable of producing minimum 8 megapixel images.
- B. Live Streaming Images: Provide web-accessible image of current site image, updated at 15 - minute intervals when construction is underway.

- C. Web-Based Interface: Provide online interface to allow viewing of each high-definition digital still image captured and stored during construction, from the Internet.
1. Access Control: Provide password-protected access for Project team administered by Contractor, providing current image access and archival image access by date and time, with images downloadable to viewer's device.
 2. Software: Provide responsive software interface for use on computer, tablet, and mobile screens with accompanying iPhone/iPad app and Android apps.
 3. Storage: Maintain images on the website for reference during entire construction period, and for not less than 30 days after Final Completion. Provide sufficient memory on remote server to store all Project images.
 4. Online Interface: Provide website interface with Project and client information and logos, calendar-based navigation interface for selecting images, and pan and zoom capability within high-definition images.
 5. Forward and Reverse: Provide capability to browse through images, moving forward and backward in time by individual image and by day.
 6. Slideshow: Provide capability to automatically display current images from sites when there are three or more cameras used.
 7. Time-Lapse: Provide capability for online display of project time-lapse.
 8. Dashboard: Provide capability to view thumbnails of all cameras on one screen.
 9. Weather: Provide corresponding weather data for each image captured.
- D. Maintain cameras and web-based access in good working order, according to web-based construction photographic documentation service provider's written instructions until Final Completion. Provide for service of cameras and related networking devices and software.

1.8 USAGE RIGHTS

- A. Obtain and transfer copyright usage rights from photographer to Design Professional and Owner for unlimited reproduction of photographic documentation.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 32 33

SECTION 01 33 00 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Submittal schedule requirements.
- 2. Administrative and procedural requirements for submittals.

B. Related Requirements:

- 1. Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
- 2. Section 01 31 00 "Project Management and Coordination" for submitting coordination drawings and subcontract list and for requirements for web-based Project software.
- 3. Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
- 4. Section 01 32 33 "Photographic Documentation" for submitting preconstruction photographs, periodic construction photographs, and Final Completion construction photographs.
- 5. Section 01 40 00 "Quality Requirements" for submitting test and inspection reports, and schedule of tests and inspections.
- 6. Section 01 77 00 "Closeout Procedures" for submitting closeout submittals and maintenance material submittals.
- 7. Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
- 8. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
- 9. Section 01 79 00 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information and physical samples that require Design Professional's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

- B. Informational Submittals: Written and graphic information and physical samples that do not require Design Professional's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Design Professional 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 Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
 3. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule as required 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 Design Professional's final release or approval.
 - g. Scheduled dates for purchasing.
 - h. Scheduled date of fabrication.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 SUBMITTAL FORMATS

- A. Submittal Information: Include the following information in each submittal:
1. Project name.
 2. Date.
 3. Name of Design Professional.
 4. Name of Contractor.
 5. Name of firm or entity that prepared submittal.

6. Names of subcontractor, manufacturer, and supplier.
7. Unique submittal number, including revision identifier. Include Specification Section number with sequential alphanumeric identifier and alphanumeric suffix for resubmittals.
8. Category and type of submittal.
9. Submittal purpose and description.
10. Number and title of Specification Section, with paragraph number and generic name for each of multiple items.
11. Drawing number and detail references, as appropriate.
12. Indication of full or partial submittal.
13. Location(s) where product is to be installed, as appropriate.
14. Other necessary identification.
15. Remarks.
16. Signature of transmitter.

B. Options: Identify options requiring selection by Design Professional.

C. Deviations and Additional Information: On each submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information and revisions, other than those requested by Design Professional and Construction Manager on previous submittals. Indicate by highlighting on each submittal or noting on attached separate sheet.

D. Submittals Utilizing Web-Based Project Software: Prepare submittals as PDF files or other format indicated by Project management software.

1.6 SUBMITTAL PROCEDURES

A. Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Create a submittal register in the SCCPSS Project Management Information System (PMIS) and attached PDF(s) to each submittal item. Prepare submittals as packages in the SCCPSS PMIS and submit to the Design Professional via SCCPSS PMIS.
 - a. Design Professional will return annotated file via SCCPSS PMIS. All submittal documents will be maintained in the SCCPSS PMIS.
2. All submittals will be done electronically through SCCPSS PMIS.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

4. Coordinate transmittal of submittals for related parts of the Work specified in different Sections, so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Design Professional 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 Design Professional'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 Contractor when a submittal being processed must be delayed for coordination.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 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 20 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 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
 - D. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 1. Note date and content of previous submittal.
 2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
 - E. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
 - F. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.
- 1.7 SUBMITTAL REQUIREMENTS
- A. 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 unsuitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:

- a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.
 - f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
4. For equipment, include the following in addition to the above, as applicable:
- a. Wiring diagrams that show factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.
- B. 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. Paper Sheet Size: Except for templates, patterns, and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
- C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package.
 2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
 - a. Project name and submittal number.
 - b. Generic description of Sample.
 - c. Product name and name of manufacturer.
 - d. Sample source.
 - e. Number and title of applicable Specification Section.
 - f. Specification paragraph number and generic name of each item.

-
3. Web-Based Project Management Software: Prepare submittals in PDF form, and upload to web-based Project software website. Enter required data in web-based software site to fully identify submittal.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
 - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain two Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record Sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 2. Manufacturer and product name, and model number if applicable.
 3. Number and name of room or space.
 4. Location within room or space.

- E. 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.
- F. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
- G. Certificates:
1. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
 2. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
 3. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
 4. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
 5. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
 6. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.
- H. Test and Research Reports:
1. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
 2. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
 3. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
 4. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
 5. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

6. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - a. Name of evaluation organization.
 - b. Date of evaluation.
 - c. Time period when report is in effect.
 - d. Product and manufacturers' names.
 - e. Description of product.
 - f. Test procedures and results.
 - g. Limitations of use.

1.8 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
 1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Design Professional.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file paper copies of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

1.9 CONTRACTOR'S REVIEW

- A. Action Submittals and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Design Professional.
- B. Contractor's Approval: Indicate Contractor's approval for each submittal with a uniform approval stamp. Include name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
 1. Design Professional will not review submittals received from Contractor that do not have Contractor's review and approval.

1.10 DESIGN PROFESSIONAL'S REVIEW

- A. Action Submittals: Design Professional will review each submittal, indicate corrections or revisions required, and return.
 - 1. Submittals by Web-Based Project Management Software: Design Professional will indicate, on Project management software website, the appropriate action.
- B. Informational Submittals: Design Professional will review each submittal and will not return it, or will return it if it does not comply with requirements. Design Professional will forward each submittal to appropriate party.
- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Design Professional.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Design Professional will return without review submittals received from sources other than Contractor.
- F. Submittals not required by the Contract Documents will be returned by Design Professional without action.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 33 00

SECTION 01 33 00.13**SITE SUBMITTAL PROCEDURES**

| Paragraph | Title | Page |
|-------------------------|------------------------------|-------------|
| PART 1 – GENERAL | | |
| 1.1 | Section Includes | 01 33 00–1 |
| 1.2 | Related Sections | 01 33 00–1 |
| 1.3 | Submittal Procedures | 01 33 00–1 |
| 1.4 | Omitted | 01 33 00–2 |
| 1.5 | Product Data | 01 33 00–2 |
| 1.6 | Shop Drawings | 01 33 00–2 |
| 1.7 | Samples | 01 33 00–3 |
| 1.8 | Design Data | 01 33 00–4 |
| 1.9 | Test Reports | 01 33 00–4 |
| 1.10 | Certificates | 01 33 00–4 |
| 1.11 | Manufacturer's Instructions | 01 33 00–4 |
| 1.12 | Manufacturer's Field Reports | 01 33 00–4 |
| 1.13 | Erection Drawings | 01 33 00–4 |
| 1.14 | Reviewed Shop Drawings | 01 33 00–5 |
| 1.15 | Submittal Checklist | 01 33 00–5 |

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

DIVISION I – GENERAL REQUIREMENTS**SECTION 01 33 00.13****SITE SUBMITTAL PROCEDURES****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Submittal procedures.
- B. Construction progress schedules.
- C. Product Data.
- D. Shop Drawings.
- E. Samples.
- F. Design data.
- G. Test reports.
- H. Certificates.
- I. Manufacturer's instructions.
- J. Manufacturer's field reports.

1.2 RELATED SECTIONS

- A. Section 01 45 00 – Quality Control: Manufacturers' field services and reports.

1.3 SUBMITTAL PROCEDURES

- A. Transmit each submittal with Engineer accepted form.
- B. Sequentially number the transmittal form. Revise submittals with original number and a sequential alphabetic suffix. Resubmit as specified for initial submittal. Indicate on revised drawings all changes that have been made other than those requested by the Engineer.
- C. Identify Project, Contractor, Subcontractor, or supplier; pertinent drawing and detail number, and specification section number, as appropriate.
- D. Apply Contractor's stamp, signed or initialed verifying review, approval, products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents. Submittal without the Contractor's stamp will be returned to Contractor without Engineer's review.

- E. Make all submittals far enough in advance of scheduled dates for installation to provide all required time for reviews, for securing necessary approvals, for possible revision and resubmittal, and for placing orders and securing delivery. In scheduling, allow sufficient time for the Engineer's review following the receipt of the submittal. Coordinate submission of related items. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
- F. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed Work.
- G. Provide space for Contractor and Architect/Engineer review stamps.
- H. When revised for resubmission, identify all changes made since previous submission.
- I. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

1.4 OMITTED

1.5 PRODUCT DATA

- A. Product Data For Review:
 - 1. Submitted to Engineer for review and conformance with information given in specifications and the design concept expressed in contract documents.
 - 2. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article above.
- B. Submit the number of copies Contractor and Owner require, plus two copies retained by Engineer.
- C. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- D. Indicate product utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- E. After review, distribute in accordance with the Submittal Procedures article above.

1.6 SHOP DRAWINGS

- A. Contractor shall submit digital shop drawing to the Engineer for review.
- B. Submitted to Engineer for review and conformance with information given in specifications and design concept expressed in contract documents. Review of shop drawings by Engineer shall not relieve Contractor of its responsibility for accuracy of shop drawings nor for furnishing of all materials and equipment required by the contract even though such items may not be indicated on shop drawings reviewed by Engineer.

- C. Shop drawings shall include applicable technical information, drawings, diagrams, performance curves, schedules, templates, calculations, instructions, measurements, and similar information as applicable to the specific item for which shop drawing is prepared.
- D. Do not use Engineer's Drawings for shop or erection purposes.
- E. Each shop drawing copy shall bear a Contractor's stamp showing they have been checked. Shop drawings submitted to the Engineer without Contractor's stamp will be returned to Contractor without review.

No review will be given to partial submittals of shop drawings for items which interconnect and/or are interdependent. It is the Contractor's responsibility to assemble shop drawings for all such interconnecting and/or interdependent items, check them and then make one submittal to Engineer.

Schedule of Submittals: Within 30 days of Contract award and prior to any shop drawing submittal, Contractor shall submit a schedule showing the estimated submittal date and desired acceptance date for each shop drawing anticipated. Time lost due to unacceptable submittals shall be the Contractor's responsibility.

1.7 SAMPLES

- A. Samples For Review:
 - 1. Submitted to Engineer for review and conformance with information given in specifications and design concept expressed in contract documents.
 - 2. After review, produce duplicates and distribute in accordance with SUBMITTAL PROCEDURES article above.
- B. Samples For Information:
 - 1. Submitted for Engineer's knowledge as contract administrator or for the Owner.
- C. Include identification on each sample, with full product information.
- D. Submit the number of samples specified in individual specification sections; one of which will be retained by Engineer.
- E. Reviewed samples which may be used in the Work are indicated in individual specification sections.
- F. Samples will not be used for testing purposes unless specifically stated in the specification section.

1.8 DESIGN DATA

- A. Submit for Engineer's knowledge as contract administrator or for the Owner.
- B. Submit for information and conformance with information given in specifications and design concept expressed in contract documents.

1.9 TEST REPORTS

- A. Submit for Engineer's knowledge as contract administrator or for the Owner.
- B. Submit test reports for information and assessing conformance with information given in specifications and design concept expressed in contract documents.

1.10 CERTIFICATES

- A. When specified in individual specification sections, submit certification by manufacturer, installation/application subcontractor, or the Contractor to Engineer, in quantities specified for Product Data.
- B. Indicate material or product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.
- C. Certificates may be recent or previous test results on material or product, but must be acceptable to Engineer.

1.11 MANUFACTURER'S INSTRUCTIONS

- A. When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, to Engineer for delivery to Owner in quantities specified for product Data.
- B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- C. Refer to Section 01 45 00 – Quality Control, Manufacturers' Field Services article.

1.12 MANUFACTURER'S FIELD REPORTS

- A. Submit reports for Engineer's benefit as contract administrator or for the Owner.
- B. Submit digital report within 15 days of observation to Engineer for information.
- C. Submit for information and assessing conformance with information given in specifications and design concept expressed in contract documents.

1.13 ERECTION DRAWINGS

- A. Submit drawings for Engineer's benefit as contract administrator or for the Owner.
- B. Submit for information and assessing conformance with information given in specifications and design concept expressed in contract documents.
- C. Data indicating inappropriate or unacceptable Work may be subject to action by the Engineer or Owner.

1.14 REVIEWED SHOP DRAWINGS

- A. Engineer Review.
1. Acceptable submittals will be marked "No Exceptions Taken." A minimum of three copies will be retained by the Engineer for Engineer's and Owner's use and remaining copies will be returned to Contractor.
 2. Submittals requiring minor corrections before the product is acceptable will be marked "Furnish as Corrected." Contractor may order, fabricate, and ship items included in submittals, provided the indicated corrections are made.
 3. Submittals marked "Revise and Resubmit" must be revised to reflect required changes and the initial review procedure repeated.
 4. The "Rejected" notation is used to indicate products not acceptable. Upon return of a submittal so marked, Contractor shall repeat the initial review procedure utilizing acceptable products.
 5. Only two copies of items marked "Revise and Resubmit" and "Rejected" will be reviewed and marked. One copy will be retained by Engineer and the other copy with all remaining unmarked copies will be returned to Contractor for resubmittal.
- B. No Work or products shall be installed without a drawing or submittal bearing the "No Exceptions Taken" or "Furnish as Corrected" notation. Contractor shall maintain at the job site a complete set of shop drawings bearing Engineer's stamp.
- C. Substitutions: In the event Contractor obtains Engineer's acceptance for use of products other than those listed first in Contract Documents, Contractor shall, at Contractor's own expense and using methods accepted by Engineer, make any changes to structures, piping and electrical work necessary to accommodate these products.
- D. Use of "No Exceptions Taken" or "Furnish as Corrected" notation on shop drawings or other submittals is general and shall not relieve Contractor of the responsibility of furnishing products of proper dimension, size, quality, quantity, materials, all performance characteristics, and to efficiently perform requirements and intent of Contract Documents. Engineer's review shall not relieve Contractor of the responsibility of errors of any kind on shop drawings. Review is intended only to assure conformance with design concept of the project and compliance with information given in Contract Documents.

1.15 SUBMITTAL CHECKLIST

- A. This checklist is not necessarily complete. Contractor is responsible to submit all items and materials as specified in each section.

| Section | Submittal | Date Received by M & N | Accepted Submittal Returned to Owner/ Contractor | Submittal Rejected & Returned | Comments |
|--|----------------------------|------------------------|--|-------------------------------|----------|
| 03 00 00 – Concrete | | | | | |
| | Mix Design | | | | |
| | Curing Compounds | | | | |
| | Joint Filler | | | | |
| | Reinforcing Steel | | | | |
| | Welded Wire Fabric | | | | |
| | Dowels/Joint Reinforcement | | | | |
| | Fiber Reinforcement | | | | |
| | Joint Plan | | | | |
| 03 30 00 – Cast-In-Place Concrete | | | | | |
| | Mix Design | | | | |
| | Reinforcing Steel | | | | |
| | Welded Wire Fabric | | | | |
| | Curing Compound | | | | |
| | Fiber Reinforcement | | | | |
| | Non-Shrink Grout | | | | |
| | Joint Filler | | | | |
| 03 31 00 – Structural Concrete | | | | | |
| | Mix Design | | | | |
| | Reinforcement | | | | |
| | Layout Plan | | | | |
| | Design Loads | | | | |
| 05 05 23 –Metal Fastenings | | | | | |

| Section | Submittal | Date Received by M & N | Accepted Submittal Returned to Owner/ Contractor | Submittal Rejected & Returned | Comments |
|---|-------------------------|------------------------|--|-------------------------------|----------|
| | Tie Rods | | | | |
| | Bearing Plates | | | | |
| | Turnbuckles | | | | |
| | Bolts | | | | |
| | Coating Certification | | | | |
| 05 12 00 – Structural Steel Framing | | | | | |
| | Materials | | | | |
| | Design Loads | | | | |
| | Mill Certificate | | | | |
| | Mill Test Reports | | | | |
| | Welder’s Certificates | | | | |
| 09 90 00 – Painting and Coating | | | | | |
| | Paint | | | | |
| 31 00 00 – Earthwork | | | | | |
| | Borrow | | | | |
| 31 09 16.23 – Driven Pile Load Tests | | | | | |
| | Test Method & Equipment | | | | |
| | Piles | | | | |
| 31 25 00 – Soil Erosion Control | | | | | |
| | Silt Fence | | | | |
| 31 37 00 – Rip-Rap | | | | | |
| | Stone | | | | |

| Section | Submittal | Date Received by M & N | Accepted Submittal Returned to Owner/ Contractor | Submittal Rejected & Returned | Comments |
|---|--------------------------------------|------------------------|--|-------------------------------|----------|
| | Sand-Cement Bag | | | | |
| | Filter Fabric | | | | |
| 31 62 19 – Timber Piles | | | | | |
| | Piles | | | | |
| | Preservative Treatment Certification | | | | |
| | Driving Equipment | | | | |
| | Pile Driving Sequence | | | | |
| 32 11 23 – Aggregate Base Course | | | | | |
| | Aggregate | | | | |
| | Prime | | | | |
| 32 11 26 – Asphaltic Base Courses | | | | | |
| | Asphalt Cement | | | | |
| | Anti-Stripping Agent | | | | |
| | Mix Design | | | | |
| 32 11 33 – Cement – Treated Base Courses | | | | | |
| | Mix Design | | | | |
| | Prime | | | | |
| 32 12 16 – Asphalt Paving | | | | | |
| | Tack Coat | | | | |
| | Asphalt Cement | | | | |
| | Anti-Stripping Agent | | | | |
| | Mix Designs | | | | |
| 32 31 13 – Chain Link Fences and Gates | | | | | |

| Section | Submittal | Date Received by M & N | Accepted Submittal Returned to Owner/ Contractor | Submittal Rejected & Returned | Comments |
|--|-----------------------------------|------------------------|--|-------------------------------|----------|
| | Fence Fabric | | | | |
| | Posts | | | | |
| | Hardware & Accessories | | | | |
| | Layout Plan | | | | |
| | Finish | | | | |
| 32 32 16 – Precast Concrete Retaining Walls | | | | | |
| | Design Data | | | | |
| | Precast Members | | | | |
| | Driving Equipment | | | | |
| | Premolded Expansion Joint Fillers | | | | |
| | Hardware | | | | |
| | Concrete Mix Design | | | | |
| | Filter Fabric | | | | |
| 32 92 00 – Turf and Grasses | | | | | |
| | Seed Mix – Temporary | | | | |
| | Seed Mix – Permanent | | | | |
| | Fertilizer | | | | |
| | Lime | | | | |
| 33 10 00 – Water Utilities | | | | | |
| | PVC Pipe – 4"Ø and Larger | | | | |
| | PVC Pipe – Smaller than 4"Ø | | | | |

| Section | Submittal | Date Received by M & N | Accepted Submittal Returned to Owner/ Contractor | Submittal Rejected & Returned | Comments |
|---------|---|------------------------|--|-------------------------------|----------|
| | D.I. Pipe | | | | |
| | Tubing for Service Lateral | | | | |
| | Fittings – PVC | | | | |
| | Fittings – Compact D.I. | | | | |
| | Gate Valve | | | | |
| | 2" Ball Valves | | | | |
| | Air Release Valve | | | | |
| | Air/Vacuum Valve | | | | |
| | Combination Air Valve | | | | |
| | Corporation Stops | | | | |
| | Curb Stops | | | | |
| | Magnetic Marking Tape | | | | |
| | Valve Boxes | | | | |
| | Valve Box Collar | | | | |
| | Hydrant Tees | | | | |
| | Threaded Rod with Bitumastic Coating and Painting | | | | |
| | Fire Hydrants | | | | |
| | Restrained Joint Fittings | | | | |
| | Service Saddles | | | | |
| | Tapping Sleeves/Crosses | | | | |
| | Tapping Valves | | | | |
| | Backflow Prevention Devices | | | | |
| | Tracing Wire | | | | |

| Section | Submittal | Date Received by M & N | Accepted Submittal Returned to Owner/ Contractor | Submittal Rejected & Returned | Comments |
|---|--|------------------------|--|-------------------------------|----------|
| | Service Pipe/Tubing | | | | |
| | Casing Pipe | | | | |
| 33 30 00 – Sanitary Sewage Utilities | | | | | |
| | Wetwell | | | | |
| | Manholes & Interior Coating | | | | |
| | Boots and S.S. Straps | | | | |
| | Joint Wrap | | | | |
| | Joint Sealant | | | | |
| | Steps | | | | |
| | Piping – PVC – Gravity | | | | |
| | Piping – PVC – Force Main | | | | |
| | Piping – DI – Gravity | | | | |
| | Piping – DI – Force Main | | | | |
| | Fittings – PVC – Gravity | | | | |
| | Fittings DI – Force Main | | | | |
| | Frames & Covers | | | | |
| | Valve Pit and Steps | | | | |
| | Valve Pit Hatch Cover | | | | |
| | Wetwell Hatch Cover | | | | |
| | Pumps and Controls | | | | |
| | Control Panel Enclosure and Mounting Materials | | | | |
| | Frost–Proof Hydrant | | | | |

| Section | Submittal | Date Received by M & N | Accepted Submittal Returned to Owner/ Contractor | Submittal Rejected & Returned | Comments |
|--|--|------------------------|--|-------------------------------|----------|
| | Backflow Prevention Device | | | | |
| | Fencing and Gate Hardware | | | | |
| | Gate Valves/Plug Valves | | | | |
| | Check Valves | | | | |
| | Air Release/Vacuum Valves | | | | |
| | Vent Pipe | | | | |
| | Hoist and Hoist Sockets | | | | |
| | Lifting Chain/Cable | | | | |
| | Pumps Mounts/Intermediate and Upper Guide Brackets | | | | |
| | Quick Disconnect | | | | |
| | Electrical W/Generator Hook-up | | | | |
| | Tracing Wire | | | | |
| | Magnetic Tape | | | | |
| | Force Main Gauges | | | | |
| | Signage (Emergency #'s etc.) | | | | |
| 33 40 00 – Storm Drainage Utilities | | | | | |
| | Reinforced Concrete Pipe | | | | |
| | Aluminum Pipe | | | | |
| | Polyethylene Pipe | | | | |
| | Gaskets | | | | |

| Section | Submittal | Date Received by M & N | Accepted Submittal Returned to Owner/ Contractor | Submittal Rejected & Returned | Comments |
|---------|-------------------------|------------------------|--|-------------------------------|----------|
| | Drainage Structures | | | | |
| | Fiberglass Grating | | | | |
| | Frames, Covers & Grates | | | | |
| | Subgrade Drain pipe | | | | |
| | Filter Fabric | | | | |
| | Tracing Wire | | | | |

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 01 33 00.13

SECTION 01 40 00 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspection services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and quality-control requirements for individual work results are specified in their respective Specification Sections. Requirements in individual Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and quality-control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and quality-control services required by Design Professional, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

1.3 DEFINITIONS

- A. Experienced: When used with an entity or individual, "experienced," unless otherwise further described, means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- B. Field Quality-Control Tests and Inspections: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- C. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, assembly, and similar operations.
 - 1. Use of trade-specific terminology in referring to a Work result does not require that certain construction activities specified apply exclusively to specific trade(s).

-
- D. Mockups: Full-size physical assemblies that are constructed either as freestanding temporary built elements or as part of permanent construction. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
1. Integrated Exterior Mockups: Mockups of the exterior envelope constructed on-site as, consisting of multiple products, assemblies, and subassemblies, with cutaways enabling inspection of concealed portions of the Work.
 2. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes; doors; windows; millwork; casework; specialties; furnishings and equipment; and lighting.
 3. In-Place Mockups: Mockups constructed on-site in their actual final location as part of permanent construction.
- E. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria. Unless otherwise indicated, copies of reports of tests or inspections performed for other than the Project do not meet this definition.
- F. Product Tests: Tests and inspections that are performed by a nationally recognized testing laboratory (NRTL) according to 29 CFR 1910.7, by a testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program (NVLAP), or by a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- G. Source Quality-Control Tests and Inspections: Tests and inspections that are performed at the source (e.g., plant, mill, factory, or shop).
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. The term "testing laboratory" shall have the same meaning as the term "testing agency."
- I. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work, to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- J. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work, to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Contractor's quality-control services do not include contract administration activities performed by Design Professional.
- 1.4 CONFLICTING REQUIREMENTS
- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Design Professional regarding the conflict and obtain clarification prior to proceeding with the Work. Refer

conflicting requirements that are different, but apparently equal, to Design Professional for clarification 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 Design Professional for a decision before proceeding.

1.5 ACTION SUBMITTALS

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

1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Reports: Prepare and submit certified written reports and documents as specified.
- D. Permits, Licenses, and Certificates: For Owner's record, 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 CONTRACTOR'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 Design Professional. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified 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: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
 3. Design Professional-performed site observations included 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 the 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 Design Professional 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.

1.8 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, telephone number, and email address of testing agency.
 4. Dates and locations of samples and tests or inspections.
 5. Names of individuals making tests and inspections.
 6. Description of the Work and test and inspection method.
 7. Identification of product and Specification Section.
 8. Complete test or inspection data.
 9. Test and inspection results and an interpretation of test results.
 10. Record of temperature and weather conditions at time of sample-taking and testing and inspection.
 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 12. Name and signature of laboratory inspector.
 13. Recommendations on retesting and reinspecting.

- 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, telephone number, and email address of technical representative making report.
 2. Statement on condition of substrates and their acceptability for installation of product.
 3. Statement that products at Project site comply with requirements.
 4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 6. Statement of 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, telephone number, and email address of factory-authorized service representative making report.
 2. Statement that equipment complies with requirements.
 3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
 4. Statement of whether conditions, products, and installation will affect warranty.
 5. Other required items indicated in individual Specification Sections.

1.9 QUALITY ASSURANCE

- A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, applying, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed

for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.

- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged in the activities indicated.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing and Inspecting Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspection indicated, as documented in accordance with ASTM E329, and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations 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 Contractor's responsibilities, including the following:
1. Provide test specimens representative of proposed products and construction.
 2. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 3. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
 4. Build site-assembled test assemblies and mockups, using installers who will perform same tasks for Project.
 5. When testing is complete, remove test specimens and test assemblies, and mockups; do not reuse products on Project.
- 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 of size indicated.
 2. Build mockups in location indicated or, if not indicated, as directed by Design Professional.
 3. Notify Design Professional seven days in advance of dates and times when mockups will be constructed.

4. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
 5. Demonstrate the proposed range of aesthetic effects and workmanship.
 6. Obtain Design Professional's approval of mockups before starting corresponding Work, fabrication, or construction.
 - a. Allow seven days for initial review and each re-review of each mockup.
 7. Promptly correct unsatisfactory conditions noted by Design Professional's preliminary review, to the satisfaction of the Design Professional, before completion of final mockup.
 8. Approval of mockups by the Design Professional does not constitute approval of deviations from the Contract Documents contained in mockups unless Design Professional specifically approves such deviations in writing.
 9. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 10. Demolish and remove mockups when directed unless otherwise indicated.
- L. Integrated Exterior Mockups: Construct integrated exterior mockup. Coordinate installation of exterior envelope materials and products for which mockups are required in individual Specification Sections, along with supporting materials. Comply with requirements in "Mockups" Paragraph.
- 1.10 QUALITY CONTROL
- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
 2. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
 2. Engage a qualified testing agency to perform quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
 4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- D. Testing Agency Responsibilities: Cooperate with Design Professional and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
1. Notify Design Professional and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the locations from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections, and state in each report whether tested and inspected Work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform duties of Contractor.
- E. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 "Submittal Procedures."
- F. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- G. Contractor's Associated Requirements and Services: Cooperate with agencies and representatives performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspection. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspection equipment at Project site.

H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.

1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.11 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: The Design Professional will engage a qualified testing agency and special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, as indicated in the Statement of Special Inspections attached to this Section, 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 Design Professional and Contractor 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 Design Professional with copy to Contractor 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. . For each fabricator that is exempt from Special Inspections of shop fabrications and implementation procedures in accordance with Section 1704.2 of the International Building Code, the Contractor shall submit a “Fabricator’s Certificate of Compliance”. The Contractor shall also provide copies of the fabricator’s certification or building code evaluation services report and the fabricator’s quality control manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:

1. Copy of request for inspection.
2. Date test or inspection was conducted.
3. Description of the Work tested or inspected.
4. Date test or inspection results were transmitted to Design Professional.
5. Identification of testing agency or special inspector conducting test or inspection.
6. Copy of report.

- B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Design Professional's reference during normal working hours.
 - 1. Submit log at Project closeout as part of Project Record Documents.

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.
 - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 40 00

STATEMENT OF SPECIAL INSPECTIONS

PROJECT: C20-23 NEW K-12 MULTI-SCHOOL

LOCATION: 100 PRISCILLA D. THOMAS WAY, GARDEN CITY, GEORGIA 31408

PERMIT APPLICANT: SAVANNAH CHATHA COUNTY PUBLIC SCHOOL SYSTEM

APPLICANT'S ADDRESS: 208 BULL STREET, SAVANNAH, GEORGIA 31401

ARCHITECT OF RECORD: LS3P ASSOCIATES LTD. / NEIL DAWSON, AIA

STRUCTURAL ENGINEER OF RECORD: THARPE ENGINEERING GROUP / M. CODY THARPE, P.E.

MECHANICAL ENGINEER OF RECORD: DULOHERY WEEKS ENGINEERS / ROBERT LAFOND, P.E.

ELECTRICAL ENGINEER OF RECORD: DULOHERY WEEKS ENGINEERS / WESLEY WOMMACK, P.E.

REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE: NEIL DAWSON, AIA

This Statement of Special Inspections is submitted in accordance with Section 1704.3 of the 2012 International Building Code. It includes a *Schedule of Special Inspection Services* applicable to the above-referenced Project as well as the identity of the individuals, agencies, or firms intended to be retained for conducting these inspections. If applicable, it includes *Requirements for Seismic Resistance* and/or *Requirements for Wind Resistance*.

Are Requirements for Seismic Resistance included in the Statement of Special Inspections? Yes No
Are Requirements for Wind Resistance included in the Statement of Special Inspections? Yes No

The Special Inspector(s) shall keep records of all inspections and shall furnish interim inspection reports to the Building Official and to the Registered Design Professional in Responsible Charge at a frequency agreed upon by the Design Professional and the Building Official prior to the start of work. Discrepancies shall be brought to the immediate attention of the Contractor for correction. If the discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Registered Design Professional in Responsible Charge prior to completion of that phase of work. A *Final Report of Special Inspections* documenting required special inspections and corrections of any discrepancies noted in the inspections shall be submitted to the Building Official and the Registered Design Professional in Responsible Charge at the conclusion of the project.

Frequency of interim report submittals to the Registered Design Professional in Responsible Charge:

Weekly Bi-Weekly Monthly Other; specify: _____

The Special Inspection program does not relieve the Contractor of the responsibility to comply with the Contract Documents. Jobsite safety and means and methods of construction are solely the responsibility of the Contractor.

Statement of Special Inspections Prepared by:

NEIL DAWSON
Type or print name

Signature Date October 9, 2020

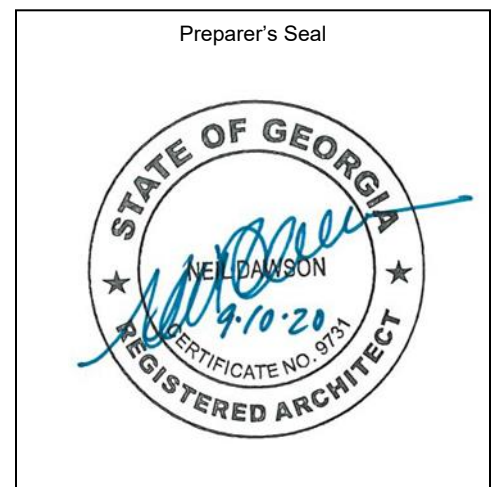
Building Official's Acceptance:

Signature Date

Permit Number:

Frequency of interim report submittals to the Building Official:

Monthly Bi-Monthly Upon Completion Other; specify: _____



Statement of Special Inspections Requirements for Seismic Resistance

See the Schedule of Special Inspections for inspection and testing requirements

Seismic Design Category: B

Statement of Special Inspection for Seismic Resistance Required (Yes/No): No

Description of seismic force-resisting system subject to special inspection and testing for seismic resistance:

(Required for Seismic Design Categories C, D, E or F in accordance with IBC Sections 1705.11.1 through 1705.11.3, 1707.12.1 and 1705.12.2.)

The lateral seismic forces are transferred through the pre-cast hollow core planks and topping slabs and into the ordinary reinforced masonry shear walls, then down to the shallow foundations.

Description of designated seismic systems subject to special inspection and testing for seismic resistance:

(Required for architectural, electrical and mechanical systems and their components that require design in accordance with Chapter 13 of ASCE 7, have a component importance factor, I_p , greater than one and are in Seismic Design Categories C, D, E or F.)

N/A

Description of additional seismic systems and components requiring special inspections and testing:

(Required for systems noted in IBC Section 1705.11, cases 3, 4 & 5 in Seismic Design Categories C, D, E or F.)

N/A

Statement of Responsibility:

Each contractor responsible for the construction or fabrication of a system or component described above must submit a Statement of Responsibility.

Statement of Special Inspections Requirements for Wind Resistance

See the Schedule of Special Inspections for inspection and testing requirements

Nominal Design Wind Speed, V_{asd} : 114 m.p.h.

Wind Exposure Category: B

Statement of Special Inspection for Wind Resistance Required (Yes/No): No
(Required in wind exposure Category B, where the nominal design wind speed, V_{asd} , is 120 miles per hour or greater. Required in wind exposure Category C or D, where the nominal design wind speed, V_{asd} , is 110 miles per hour or greater.)

Description of main windforce-resisting system subject to special inspection for wind resistance:

(Required for systems noted in IBC Section 1705.10.1 and 1705.10.2)

The lateral wind forces are transferred through the pre-cast hollow core planks and topping slabs and into the ordinary reinforced masonry shear walls, then down to the shallow foundations.

Description of windforce-resisting components subject to special inspection for wind resistance:

(Required for systems and components noted in IBC Section 1705.10.3)

N/A

Statement of Responsibility:

Each contractor responsible for the construction or fabrication of a system or component described above must submit a Statement of Responsibility.

FINAL REPORT OF SPECIAL INSPECTIONS

PROJECT: C20-23 NEW K-12 MULTI-SCHOOL

LOCATION: 100 PRISCILLA D. THOMAS WAY, GARDEN CITY, GEORGIA 31408

PERMIT APPLICANT: SAVANNAH CHATHA COUNTY PUBLIC SCHOOL SYSTEM

APPLICANT'S ADDRESS: 208 BULL STREET, SAVANNAH, GEORGIA 31401

ARCHITECT OF RECORD: LS3P ASSOCIATES LTD. / NEIL DAWSON, AIA

STRUCTURAL ENGINEER OF RECORD: THARPE ENGINEERING GROUP / M. CODY THARPE, P.E.

MECHANICAL ENGINEER OF RECORD: DULOHERY WEEKS ENGINEERS / ROBERT LAFOND, P.E.

ELECTRICAL ENGINEER OF RECORD: DULOHERY WEEKS ENGINEERS / WESLEY WOMMACK, P.E

REGISTERED DESIGN PROFESSIONAL IN RESPONSIBLE CHARGE: NEIL DAWSON, AIA

To the best of my information, knowledge, and belief, which are based upon observations or diligent supervision of our inspection services for the above-referenced Project, I hereby state that the special inspections or testing required for this Project, and designated for this Agent in the *Schedule of Special Inspection Services*, have been completed in accordance with the Contract Documents.

The Special Inspection program does not relieve the Contractor of the responsibility to comply with the Contract Documents. Jobsite safety and means and methods of construction are solely the responsibility of the Contractor.

Interim reports submitted prior to this final report and numbered ___ to ___ form a basis for, and are to be considered an integral part of this final report. The following discrepancies that were outstanding since the last interim report dated _____ have been corrected:

(Attach 8 1/2"x11" continuation sheet(s) if required to complete the description of corrections)

Prepared By:

Special Inspection Agent/Firm

Type or print name

Signature

Date

| SCHEDULE OF SPECIAL INSPECTION SERVICES | | | | | |
|---|---|----------------------------|---------------------------------|--------|----------------|
| PROJECT | | | | | |
| MATERIAL / ACTIVITY | SERVICE | APPLICABLE TO THIS PROJECT | | | |
| | | Y/N | EXTENT | AGENT* | DATE COMPLETED |
| 1704.2.5 Inspection of Fabricators | | | | | |
| Verify fabrication/quality control procedures | In-plant review (3) | Y | Periodic | 1 | |
| 1705.1.1 Special Cases (work unusual in nature, including but not limited to alternative materials and systems, unusual design applications, materials and systems with special manufacturer's requirements) | Submittal review, shop (3) and/or field inspection | N | N/A | | |
| 1705.2 Steel Construction | | | | | |
| 1. Fabricator and erector documents (Verify reports and certificates as listed in AISC 360, chapter N, paragraph 3.2 for compliance with construction documents) | Submittal Review | Y | Each submittal | 1 | |
| 2. Material verification of structural steel | Shop (3) and field inspection | Y | Periodic | 1 | |
| 3. Embedments (Verify diameter, grade, type, length, embedment. See 1705.3 for anchors) | Field inspection | Y | Periodic | 1 | |
| 4. Verify member locations, braces, stiffeners, and application of joint details at each connection comply with construction documents | Field inspection | Y | Periodic | 1 | |
| 5. Structural steel welding: | | | | | |
| a. Inspection tasks Prior to Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-1) | Shop (3) and field inspection | Y | Observe or Perform as noted (4) | 1 | |
| b. Inspection tasks During Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-2) | Shop (3) and field inspection | Y | Observe (4) | 1 | |
| c. Inspection tasks After Welding (Observe, or perform for each welded joint or member, the QA tasks listed in AISC 360, Table N5.4-3) | Shop (3) and field inspection | Y | Observe or Perform as noted (4) | 1 | |
| d. Nondestructive testing (NDT) of welded joints: <i>see Commentary</i> | | | | | |
| 1) Complete penetration groove welds 5/16" or greater in <i>risk category III</i> or <i>IV</i> | Shop (3) or field ultrasonic testing - 100% | Y | Periodic | 1 | |
| 2) Complete penetration groove welds 5/16" or greater in <i>risk category II</i> | Shop (3) or field ultrasonic testing - 10% of welds minimum | Y | Periodic | 1 | |
| 3) Thermally cut surfaces of access holes when material $t > 2"$ | Shop (3) or field magnetic Partical or Penetrant testing | N | N/A | | |
| 4) Welded joints subject to fatigue when required by AISC 360, Appendix 3, Table A-3.1 | Shop (3) or field radiographic or Ultrasonic testing | N | N/A | | |
| 5) Fabricator's NDT reports when fabricator performs NDT | Verify reports | Y | Each submittal (5) | 1 | |
| 6. Structural steel bolting: | | | | | |
| a. Inspection tasks Prior to Bolting (Observe, or perform tasks for each bolted connection, in accordance with QA tasks listed in AISC 360, Table N5.6-1) | Shop (3) and field inspection | Y | Observe or Perform as noted (4) | 1 | |

| SCHEDULE OF SPECIAL INSPECTION SERVICES | | | | | |
|--|---|----------------------------|----------------|--------|----------------|
| PROJECT | | | | | |
| MATERIAL / ACTIVITY | SERVICE | APPLICABLE TO THIS PROJECT | | | |
| | | Y/N | EXTENT | AGENT* | DATE COMPLETED |
| b. Inspection tasks During Bolting (Observe the QA tasks listed in AISC 360, Table N5.6-2) | | | | | |
| 1) Pre-tensioned and slip-critical joints | | | | | |
| a) Turn-of-nut with matching markings | Shop (3) and field inspection | N | N/A | | |
| b) Direct tension indicator | Shop (3) and field inspection | N | N/A | | |
| c) Twist-off type tension control bolt | Shop (3) and field inspection | N | N/A | | |
| d) Turn-of-nut without matching markings | Shop (3) and field inspection | N | N/A | | |
| e) Calibrated wrench | Shop (3) and field inspection | N | N/A | | |
| 2) Snug-tight joints | Shop (3) and field inspection | Y | Periodic | 1 | |
| c. Inspection tasks After Bolting (Perform tasks for each bolted connection in accordance with QA tasks listed in AISC 360, Table N5.6-3) | Shop (3) and field inspection | Y | Perform (4) | 1 | |
| 7. Inspection of steel elements of composite construction prior to concrete placement in accordance with QA tasks listed in AISC 360, Table N6.1 | Shop (3) and field inspection and testing | N | N/A | | |
| 1705.2.2 Steel Construction Other Than Structural Steel | | | | | |
| 1. Material verification of cold-formed steel deck: | | | | | |
| a. Identification markings | Field inspection | Y | Periodic | 1 | |
| b. Manufacturer's certified test reports | Submittal Review | Y | Each submittal | 1 | |
| 2. Connection of cold-formed steel deck to supporting structure: | | | | | |
| a. Welding | Shop (3) and field inspection | Y | Periodic | 1 | |
| b. Other fasteners (in accordance with AISC 360, Section N6) | | | | | |
| 1) Verify fasteners are in conformance with approved submittal | Shop (3) and field inspection | Y | Periodic | 1 | |
| 2) Verify fastener installation is in conformance with approved submittal and manufacturer's recommendations | Shop (3) and field inspection | Y | Periodic | 1 | |
| 3. Reinforcing steel | | | | | |
| a. Verification of weldability of steel other than ASTM A706 | Shop (3) and field inspection | N | N/A | | |
| b. Reinforcing steel resisting flexural and axial forces in intermediate and special moment frames, boundary elements of special concrete structural walls and shear reinforcement | Shop (3) and field inspection | N | N/A | | |
| c. Shear reinforcement | Shop (3) and field inspection | N | N/A | | |
| d. Other reinforcing steel | Shop (3) and field inspection | Y | Periodic | 1 | |
| 4. Cold-formed steel trusses spanning 60 feet or greater | | | | | |
| a. Verify temporary and permanent restraint/bracing are installed in accordance with the approved truss submittal package | Field inspection | Y | Periodic | 1 | |
| 1705.3 Concrete Construction | | | | | |
| 1. Inspection of reinforcing steel installation (see 1705.2.2 for welding) | Shop (3) and field inspection | Y | Periodic | 1 | |
| 2. Inspection of prestressing steel installation | Shop (3) and field inspection | N | N/A | | |

| SCHEDULE OF SPECIAL INSPECTION SERVICES | | | | | |
|--|--|----------------------------|---|--------|----------------|
| PROJECT | | | | | |
| MATERIAL / ACTIVITY | SERVICE | APPLICABLE TO THIS PROJECT | | | |
| | | Y/N | EXTENT | AGENT* | DATE COMPLETED |
| 3. Inspection of anchors cast in concrete where allowable loads have been increased per section 1908.5 or where strength design is used | Shop (3) and field inspection | N | N/A | | |
| 4. Inspection of anchors and reinforcing steel post-installed in hardened concrete: Per research reports including verification of anchor type, anchor dimensions, hole dimensions, hole cleaning procedures, anchor spacing, edge distances, concrete minimum thickness, anchor embedment and tightening torque | Field inspection | Y | Periodic or as required by the research report issued by an approved source | 1 | |
| 5. Verify use of approved design mix | Shop (3) and field inspection | Y | Periodic | 1 | |
| 6. Fresh concrete sampling, perform slump and air content tests and determine temperature of concrete | Shop (3) and field inspection | Y | Continuous | 1 | |
| 7. Inspection of concrete and shotcrete placement for proper application techniques | Shop (3) and field inspection | Y | Continuous | 1 | |
| 8. Inspection for maintenance of specified curing temperature and techniques | Shop (3) and field inspection | Y | Periodic | 1 | |
| 9. Inspection of prestressed concrete: | | | | | |
| a. Application of prestressing force | Shop (3) and field inspection | N | N/A | | |
| b. Grouting of bonded prestressing tendons in the seismic-force-resisting system | Shop (3) and field inspection | N | N/A | | |
| 10. Erection of precast concrete members | | | | | |
| a. Inspect in accordance with construction documents | Field inspection | Y | In accordance with construction documents | 1 | |
| b. Perform inspections of welding and bolting in accordance with Section 1705.2 | Field inspection | Y | In accordance with Section 1705.2 | 1 | |
| 11. Verification of in-situ concrete strength, prior to stressing of tendons in post tensioned concrete and prior to removal of shores and forms from beams and structural slabs | Review field testing and laboratory reports | N | N/A | | |
| 12. Inspection of formwork for shape, lines, location and dimensions | Field inspection | Y | Periodic | 1 | |
| 13. Concrete strength testing and verification of compliance with construction documents | Field testing and review of laboratory reports | Y | Periodic | 1 | |
| 1705.4 Masonry Construction | | | | | |
| (A) Level A, B and C Quality Assurance: | | | | | |
| 1. Verify compliance with approved submittals | Field Inspection | Y | Periodic | 1 | |
| (B) Level B Quality Assurance: | | | | | |
| 1. Verification of f'_m and f'_{AAC} prior to construction | Testing by unit strength method or prism test method | Y | Periodic | 1 | |

| SCHEDULE OF SPECIAL INSPECTION SERVICES | | | | | |
|---|--|----------------------------|--------------------|--------|----------------|
| PROJECT | | | | | |
| MATERIAL / ACTIVITY | SERVICE | APPLICABLE TO THIS PROJECT | | | |
| | | Y/N | EXTENT | AGENT* | DATE COMPLETED |
| (C) Level C Quality Assurance: | | | | | |
| 1. Verification of f'_m and f'_{AAC} prior to construction and for every 5,000 SF during construction | Testing by unit strength method or prism test method | N | N/A | | |
| 2. Verification of proportions of materials in premixed or preblended mortar, prestressing grout, and grout other than self-consolidating grout, as delivered to the project site | Field inspection | N | N/A | | |
| 3. Verify placement of masonry units | Field Inspection | N | N/A | | |
| (D) Levels B and C Quality Assurance: | | | | | |
| 1. Verification of Slump Flow and Visual Stability Index (VSI) of self-consolidating grout as delivered to the project | Field testing | Y | Periodic | | |
| 2. Verify compliance with approved submittals | Field inspection | Y | Periodic | 1 | |
| 3. Verify proportions of site-mixed mortar, grout and prestressing grout for bonded tendons | Field Inspection | Y | Periodic | 1 | |
| 4. Verify grade, type, and size of reinforcement and anchor bolts, and prestressing tendons and anchorages | Field Inspection | Y | Periodic | 1 | |
| 5. Verify construction of mortar joints | Field Inspection | Y | Periodic | 1 | |
| 6. Verify placement of reinforcement, connectors, and prestressing tendons and anchorages | Field Inspection | Y | Level B - Periodic | 1 | |
| | | N | Level C - N/A | | |
| 7. Verify grout space prior to grouting | Field Inspection | Y | Level B - Periodic | 1 | |
| | | N | Level C - N/A | | |
| 8. Verify placement of grout and prestressing grout for bonded tendons | Field Inspection | N | N/A | | |
| 9. Verify size and location of structural masonry elements | Field Inspection | Y | Periodic | 1 | |
| 10. Verify type, size, and location of anchors, including details of anchorage of masonry to structural members, frames, or other construction. | Field inspection | Y | Level B - Periodic | 1 | |
| | | N | Level C - N/A | | |
| 11. Verify welding of reinforcement (see 1705.2.2) | Field inspection | N | N/A | | |
| 12. Verify preparation, construction, and protection of masonry during cold weather (temperature below 40°F) or hot weather (temperature above 90°F) | Field inspection | Y | Periodic | | |
| 13. Verify application and measurement of prestressing force | Field Inspection | N | N/A | | |

| SCHEDULE OF SPECIAL INSPECTION SERVICES | | | | | |
|--|----------------------------|-----|--------------------|--------|----------------|
| PROJECT | APPLICABLE TO THIS PROJECT | | | | |
| MATERIAL / ACTIVITY | SERVICE | Y/N | EXTENT | AGENT* | DATE COMPLETED |
| 14. Verify placement of AAC masonry units and construction of thin-bed mortar joints (first 5000 SF of AAC masonry) | Field inspection | N | N/A | | |
| 15. Verify placement of AAC masonry units and construction of thin-bed mortar joints (after the first 5000 SF of AAC masonry) | Field inspection | N | Level B - N/A | | |
| | | N | Level C - N/A | | |
| 16. Verify properties of thin-bed mortar for AAC masonry (first 5000 SF of AAC masonry) | Field inspection | N | N/A | | |
| 17. Verify properties of thin-bed mortar for AAC masonry (after the first 5000 SF of AAC masonry) | Field inspection | N | Level B - N/A | | |
| | | N | Level C - N/A | | |
| 18. Prepare grout and mortar specimens | Field testing | Y | Level B - Periodic | 1 | |
| | | N | Level C - N/A | | |
| 19. Observe preparation of prisms | Field inspection | N | Level B - N/A | | |
| | | N | Level C - N/A | | |
| 1705.5 Wood Construction | | | | | |
| 1. Inspection of the fabrication process of wood structural elements and assemblies in accordance with Section 1704.2.5 | In-plant review (3) | N | N/A | | |
| 2. For high-load diaphragms, verify grade and thickness of structural panel sheathing agree with approved building plans | Field inspection | N | N/A | | |
| 3. For high-load diaphragms, verify nominal size of framing members at adjoining panel edges, nail or staple diameter and length, number of fastener lines, and that spacing between fasteners in each line and at edge margins agree with approved building plans | Field inspection | N | N/A | | |
| 4. Metal-plate-connected wood trusses spanning 60 feet or greater: verify temporary and permanent restraint/bracing are installed in accordance with the approved truss submittal package | Field inspection | N | N/A | | |
| 1705.6 Soils | | | | | |
| 1. Verify materials below shallow foundations are adequate to achieve the design bearing capacity. | Field inspection | Y | Periodic | 1 | |
| 2. Verify excavations are extended to proper depth and have reached proper material. | Field inspection | Y | Periodic | 1 | |
| 3. Perform classification and testing of controlled fill materials. | Field inspection | Y | Periodic | 1 | |
| 4. Verify use of proper materials, densities, and lift thicknesses during placement and compaction of controlled fill | Field inspection | Y | Continuous | 1 | |
| 5. Prior to placement of controlled fill, observe subgrade and verify that site has been prepared properly | Field inspection | Y | Periodic | 1 | |

| SCHEDULE OF SPECIAL INSPECTION SERVICES | | | | | |
|--|------------------------------|----------------------------|--------|--------|----------------|
| PROJECT | | | | | |
| MATERIAL / ACTIVITY | SERVICE | APPLICABLE TO THIS PROJECT | | | |
| | | Y/N | EXTENT | AGENT* | DATE COMPLETED |
| 1705.7 Driven Deep Foundations | | | | | |
| 1. Verify element materials, sizes and lengths comply with requirements | Field inspection | N | N/A | | |
| 2. Determine capacities of test elements and conduct additional load tests, as required | Field inspection | N | N/A | | |
| 3. Observe driving operations and maintain complete and accurate records for each element | Field inspection | N | N/A | | |
| 4. Verify placement locations and plumbness, confirm type and size of hammer, record number of blows per foot of penetration, determine required penetrations to achieve design capacity, record tip and butt elevations and document any damage to foundation element | Field inspection | N | N/A | | |
| 5. For steel elements, perform additional inspections per Section 1705.2 | See Section 1705.2 | N | N/A | | |
| 6. For concrete elements and concrete-filled elements, perform additional inspections per Section 1705.3 | See Section 1705.3 | N | N/A | | |
| 7. For specialty elements, perform additional inspections as determined by the registered design professional in responsible charge | Field inspection | N | N/A | | |
| 8. Perform additional inspections and tests in accordance with the construction documents | Field Inspection and testing | N | N/A | | |
| 1705.8 Cast-in-Place Deep Foundations | | | | | |
| 1. Observe drilling operations and maintain complete and accurate records for each element | Field inspection | N | N/A | | |
| 2. Verify placement locations and plumbness, confirm element diameters, bell diameters (if applicable), lengths, embedment into bedrock (if applicable) and adequate end-bearing strata capacity. Record concrete or grout volumes | Field inspection | N | N/A | | |
| 3. For concrete elements, perform additional inspections in accordance with Section 1705.3 | See Section 1705.3 | N | N/A | | |
| 4. Perform additional inspections and tests in accordance with the construction documents | Field Inspection and testing | N | N/A | | |
| 1705.9 Helical Pile Foundations | | | | | |
| 1. Verify installation equipment, pile dimensions, tip elevations, final depth, final installation torque and other data as required. | Field inspection | N | N/A | | |
| 2. Perform additional inspections and tests in accordance with the construction documents | Field Inspection and testing | N | N/A | | |

| SCHEDULE OF SPECIAL INSPECTION SERVICES | | | | | |
|--|-------------------------------|----------------------------|----------|--------|----------------|
| PROJECT | | | | | |
| MATERIAL / ACTIVITY | SERVICE | APPLICABLE TO THIS PROJECT | | | |
| | | Y/N | EXTENT | AGENT* | DATE COMPLETED |
| 1705.10.1 Structural Wood Special Inspections For Wind Resistance | | | | | |
| 1. Inspection of field gluing operations of elements of the main windforce-resisting system | Field inspection | N | N/A | | |
| 2. Inspection of nailing, bolting, anchoring and other fastening of components within the main windforce-resisting system | Shop (3) and field inspection | N | N/A | | |
| 1705.10.2 Cold-formed Steel Special Inspections For Wind Resistance | | | | | |
| 1. Inspection during welding operations of elements of the main windforce-resisting system | Shop (3) and field inspection | N | N/A | | |
| 2. Inspections for screw attachment, bolting, anchoring and other fastening of components within the main windforce-resisting system | Shop (3) and field inspection | N | N/A | | |
| 1705.10.3 Wind-resisting Components | | | | | |
| 1. Roof cladding | Shop (3) and field inspection | Y | Periodic | 1 | |
| 2. Wall cladding | Shop (3) and field inspection | Y | Periodic | 1 | |
| 1705.11.1 Structural Steel Special Inspections for Seismic Resistance | | | | | |
| Inspection of structural steel in accordance with AISC 341 | Shop (3) and field inspection | N | N/A | | |
| 1705.11.2 Structural Wood Special Inspections for Seismic Resistance | | | | | |
| 1. Inspection of field gluing operations of elements of the seismic-force resisting system | Field inspection | N | N/A | | |
| 2. Inspection of nailing, bolting, anchoring and other fastening of components within the seismic-force-resisting system | Shop (3) and field inspection | N | N/A | | |
| 1705.11.3 Cold-formed Steel Light-Frame Construction Special Inspections for Seismic Resistance | | | | | |
| 1. Inspection during welding operations of elements of the seismic-force-resisting system | Shop (3) and field inspection | N | N/A | | |
| 2. Inspections for screw attachment, bolting, anchoring and other fastening of components within the seismic-force-resisting system | Shop (3) and field inspection | N | N/A | | |
| 1705.11.4 Designated Seismic Systems Verification | | | | | |
| Inspect and verify that that the component label, anchorage or mounting conforms to the certificate of compliance in accordance with Section 1705.12.3 | Field inspection | N | N/A | | |

| SCHEDULE OF SPECIAL INSPECTION SERVICES | | | | | |
|---|------------------------------------|----------------------------|--------|--------|----------------|
| PROJECT | | | | | |
| MATERIAL / ACTIVITY | SERVICE | APPLICABLE TO THIS PROJECT | | | |
| | | Y/N | EXTENT | AGENT* | DATE COMPLETED |
| 1705.11.5 Architectural Components Special Inspections for Seismic Resistance | | | | | |
| 1. Inspection during the erection and fastening of exterior cladding and interior and exterior veneer | Field inspection | N | N/A | | |
| 2. Inspection during the erection and fastening of interior and exterior nonbearing walls | Field inspection | N | N/A | | |
| 3. Inspection during anchorage of access floors | Field inspection | N | N/A | | |
| 1705.11.6 Mechanical and Electrical Components Special Inspections for Seismic Resistance | | | | | |
| 1. Inspection during the anchorage of electrical equipment for emergency or standby power systems | Field inspection | N | N/A | | |
| 2. Inspection during the anchorage of other electrical equipment | Field inspection | N | N/A | | |
| 3. Inspection during installation and anchorage of piping systems designed to carry hazardous materials, and their associated mechanical units | Field inspection | N | N/A | | |
| 4. Inspection during the installation and anchorage of HVAC ductwork that will contain hazardous materials | Field inspection | N | N/A | | |
| 5. Inspection during the installation and anchorage of vibration isolation systems | Field inspection | N | N/A | | |
| 1705.11.7 Storage Racks Special Inspections for Seismic Resistance | | | | | |
| Inspection during the anchorage of storage racks 8 feet or greater in height | Field inspection | N | N/A | | |
| 1705.11.8 Seismic Isolation Systems | | | | | |
| Inspection during the fabrication and installation of isolator units and energy dissipation devices used as part of the seismic isolation system | Shop and field inspection | N | N/A | | |
| 1705.12.1 Concrete Reinforcement Testing and Qualification for Seismic Resistance | | | | | |
| 1. Review certified mill test reports for each shipment of reinforcement used to resist earthquake-induced flexural and axial forces in reinforced concrete special moment frames, special structural walls, and coupling beams connecting special structural walls | Review certified mill test reports | N | N/A | | |

| SCHEDULE OF SPECIAL INSPECTION SERVICES | | | | | |
|---|----------------------------------|----------------------------|---------------------------|--------|----------------|
| PROJECT | | | | | |
| MATERIAL / ACTIVITY | SERVICE | APPLICABLE TO THIS PROJECT | | | |
| | | Y/N | EXTENT | AGENT* | DATE COMPLETED |
| 2. Verify reinforcement weldability of ASTM A615 reinforcement used to resist earthquake-induced flexural and axial forces in reinforced concrete special moment frames, special structural walls, and coupling beams connecting special structural walls | Review test reports | N | N/A | | |
| 1705.12.2 Structural Steel Testing and Qualification for Seismic Resistance | | | | | |
| Test in accordance with the quality assurance requirements of AISC 341 | Shop (3) and field testing | N | N/A | | |
| 1705.12.3 Seismic Certification of Nonstructural Components | | | | | |
| Review certificate of compliance for designated seismic system components. | Certificate of compliance review | N | N/A | | |
| 1705.12.4 Seismic Isolation Systems | | | | | |
| Test seismic isolation system in accordance with ASCE 7 Section 17.8 | Prototype testing | N | N/A | | |
| 1705.13 Sprayed Fire-resistant Materials | | | | | |
| 1. Verify surface condition preparation of structural members | Field inspection | Y | Periodic | 1 | |
| 2. Verify application of sprayed fire-resistant materials | Field inspection | Y | Periodic | 1 | |
| 3. Verify average thickness of sprayed fire-resistant materials applied to structural members | Field inspection | Y | Periodic | 1 | |
| 4. Verify density of the sprayed fire-resistant material complies with approved fire-resistant design | Field inspection and testing | Y | Per IBC Section 1705.13.5 | 1 | |
| 5. Verify the cohesive/adhesive bond strength of the cured sprayed fire-resistant material | Field inspection and testing | Y | Per IBC Section 1705.13.6 | 1 | |
| 1705.14 Mastic and Intumescent Fire-Resistant Coatings | | | | | |
| Inspect mastic and intumescent fire-resistant coatings applied to structural elements and decks | Field inspection | Y | Periodic | 1 | |
| 1705.15 Exterior Insulation and Finish Systems (EIFS) | | | | | |
| 1. Verify materials, details and installations are per the approved construction documents | Field inspection | Y | Periodic | 1 | |
| 2. Inspection of water-resistive barrier over sheathing substrate | Field inspection | Y | Periodic | 1 | |

| SCHEDULE OF SPECIAL INSPECTION SERVICES | | | | | |
|---|----------------|----------------------------|----------------|----------------------|----------------|
| PROJECT | | | | | |
| MATERIAL / ACTIVITY | SERVICE | APPLICABLE TO THIS PROJECT | | | |
| | | Y/N | EXTENT | AGENT* | DATE COMPLETED |
| 1705.16 Fire-Resistant Penetrations and Joints | | | | | |
| 1. Inspect penetration firestop systems | Field testing | Y | Per ASTM E2174 | 1 | |
| 2. Inspect fire-resistant joint systems | Field testing | Y | Per ASTM E2393 | 1 | |
| 1705.17 Smoke Control Systems | | | | | |
| 1. Leakage testing and recording of device locations prior to concealment | Field testing | Y | Periodic | 1 | |
| 2. Prior to occupancy and after sufficient completion, pressure difference testing, flow measurements, and detection and control verification | Field testing | Y | Periodic | 1 | |
| * INSPECTION AGENTS | | | | | |
| FIRM | ADDRESS | | | TELEPHONE NO. | |
| Notes: | | | | | |
| 2. | | | | | |
| 3. | | | | | |
| 4. | | | | | |
| Notes: | | | | | |
| 1. The inspection and testing agent(s) shall be engaged by the Owner or the Owner's Agent, and not by the Contractor or Subcontractor whose work is to be inspected or tested. Any conflict of interest must be disclosed to the Building Official prior to commencing work. The qualifications of the Special Inspector(s) and/or testing agencies may be subject to the approval of the Building Official and/or the Design Professional. | | | | | |
| 2. The list of Special Inspectors may be submitted as a separate document, if noted so above. | | | | | |
| 3. Special Inspections as required by Section 1704.2.5 are not required where the fabricator is approved in accordance with IBC Section 1704.2.5.2. | | | | | |
| 4. Steel Construction inspection extents marked as Observe indicates the inspection shall be on a random basis; operations need not be delayed pending these inspections. Steel Construction inspection extents marked as Perform indicates the inspection shall be for each welded joint, bolted connection, or steel element. | | | | | |
| 5. NDT of welds completed in an approved fabricator's shop may be performed by that fabricator when approved by the AHJ. Refer to AISC 360, N7. | | | | | |
| 6. Inspections indicated with a Periodic extent shall be performed by the special inspector who is intermittently present where the work to be inspected has been or is being performed. The Periodic extent shall be no less than Weekly within the duration of the activity. | | | | | |
| 7. Inspections indicated with a Continuous extent shall be performed by the special inspector who is present when and where the work is being performed. | | | | | |
| Are Requirements for Seismic Resistance included in the Statement of Special Inspections? | | | | <u>Yes</u> | No |
| Are Requirements for Wind Resistance included in the Statement of Special Inspections? | | | | <u>Yes</u> | No |
| DATE: | | | | 10/9/2020 | |

Contractor's Statement of Responsibility

Each contractor responsible for the construction or fabrication of a main wind or seismic force-resisting system, designated seismic system or wind or seismic-resisting component listed in the Statement of Special Inspections, Requirements for Seismic or Wind Resistance, must submit a Statement of Responsibility.

Project: _____

Contractor's Name: _____

Address: _____

License No.: _____

Description of building systems and components included in Statement of Responsibility:

Contractor's Acknowledgement of Special Requirements

I hereby acknowledge that I have received, read, and understand the Statement of Special Inspections and Special Inspection program:

I hereby acknowledge that control will be exercised to obtain conformance with the approved construction documents.

Name and Title (type or print)

Signature

Date

Contractor's Provisions for Quality Control

Procedures for exercising control within the contractor's organization, the method and frequency of reporting and distribution of reports is attached to this Statement.

Identification and qualifications of the person(s) exercising such control and their position(s) in the organization are attached to this Statement

SPECIAL INSPECTION DAILY REPORT

| | |
|---|---------|
| PROJECT NAME / ADDRESS: | |
| INSPECTION TYPE(S) COVERAGE <input type="checkbox"/> CONTINUOUS <input type="checkbox"/> PERIODIC TIME BEGINNING INSPECTION: TIME ENDING INSPECTION: | |
| DESCRIBE INSPECTIONS MADE, INCLUDING LOCATIONS: | |
| LIST TESTS MADE: | |
| LIST ITEMS REQUIRING CORRECTIONS, CORRECTIONS OF PREVIOUSLY LISTED ITEMS AND PREVIOUSLY LISTED UNCORRECTED ITEMS: PROVIDE COPIES OF DISCREPANCY NOTICES: | |
| COMMENTS: | |
| TO THE BEST OF MY KNOWLEDGE, WORK INSPECTED WAS IN ACCORDANCE WITH THE APPROVED DESIGN DRAWINGS, AND SPECIFICATIONS, EXCEPT AS NOTED ABOVE. | |
| PRINTED FULL NAME | |
| NOTE BY "SPECIAL INSPECTOR" OR PROVIDE NAME OF TESTING AGENCY | |
| SIGNED: | DATE: |
| CERTIFICATION: | NUMBER: |

One copy of this report to remain at job site with the contractor for review upon request.

SPECIAL INSPECTION DISCREPANCY NOTICE

| | | |
|---|--------------------|-------|
| PROJECT NAME / ADDRESS: | | |
| INSPECTION TYPE(S) COVERAGE | | |
| <input type="checkbox"/> CONTINUOUS <input type="checkbox"/> PERIODIC | | |
| AREA INSPECTED | TYPE OF INSPECTION | |
| NOTICE DELIVERED TO: <input type="radio"/> CONTRACTOR <input type="radio"/> ENGINEER/ARCHITECT <input type="radio"/> OWNER | DATE: | TIME: |
| MAKE THE FOLLOWING CORRECTIONS AND SECURE INSPECTION APPROVAL PRIOR TO PROCEEDING WITH THIS PHASE OF THE WORK. | | |
| | | |
| PRINTED FULL NAME | | |
| NOTE BY "SPECIAL INSPECTOR" OR PROVIDE NAME OF TESTING AGENCY | | |
| SIGNED: | DATE: | |
| CERTIFICATION: | NUMBER: | |

One copy of this report to remain at job site with the contractor for review upon request.

SECTION 01 41 00 – REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 REGULATORY AGENCIES

- A. Contractor is responsible for notifying the following agencies of the date that construction activities are scheduled to commence:
1. Clerk of Superior Court in County in which the project is to be constructed; “Notice of Commencement”.
 2. Employment Eligibility Verification
 3. City or County Building Inspectors
 4. EPA/EPD
 5. Department of Natural Resources
 6. Utility Companies
- B. Contractor is responsible for notifying the following agencies as to the date the building is ready for preliminary and/or final inspection:
1. State Fire Marshal
 2. Local Fire Marshal
 3. City or County Building Inspectors
- C. Inspection Reports:
1. Contractor shall send two copies of required notifications transmitted to Design Professional.
 2. Contractor shall have all inspections reports sent directly to him with copies to the Owner, Design Professional and Structural Engineer.
 3. In the event of an inspection by one of the above listed agencies is not required, the Contractor shall notify the Owner and Design Professional in writing which agency and why the inspection is not required.
- D. Forms:
1. Form of “Notice of Commencement” included at the end of this Section.
 2. Application for 80% Preliminary and 100% Final Inspections by State Fire Marshal included at the end of this Section.
 3. The Contractor shall obtain all necessary forms from agencies required by respective agency.
 4. EEV Affidavit and Agreement.
- E. Fees and Costs:
1. The Contractor shall pay all inspection fees required and performed by agencies having jurisdiction.

- a. The Contractor is responsible for fee payments until all contract-related deficiencies are corrected to the satisfaction of the inspecting agency.
 - b. If non-contract related deficiencies exist, the Contractor's responsibility is not negated until all contract related deficiencies are corrected.
2. The Contractor is responsible for costs associated with initial inspection and follow-up inspections (re-inspections), when required, until all documented deficient work has been corrected and Occupancy Permits have been issued by all authorities having jurisdiction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 GENERAL

- A. Within 7 Calendar Days of Commencement of Construction Activities, the Contractor shall transmit to the Clerk of the Superior Court in the County in which the project is located, the form of "Notice of Commencement".
- B. In an appropriate and timely manner and using applicable forms, notify the authorities having jurisdiction that the Project is ready for required inspections.
 1. Written notification required, indicating:
 - a. Type of inspection required.
 - b. State of Project construction.
 - c. Proposed date of inspection.
 - d. Other requirements of specific agency or authority.
 2. Transmit copy to Design Professional.
- C. Contractor assists inspecting authority in performance of inspections.
 1. Contractor's Project Manager and Site Forman shall accompany the inspector until inspection is complete.
 2. Provide equipment required for inspections, including but not limited to:
 - a. Flashlights.
 - b. Mirrors.
 - c. Ladders.
 - d. Measuring devices.
 - e. Other items required by specific inspection agency.

3.2 INSPECTION – STATE FIRE MARSHAL

- A. Eighty percent (80%) Inspection:

1. Notify State Fire Marshal and request inspection upon completion of 80% of the Project, providing a minimum of 21-day notice.
 2. 80% completion is defined as having structural components in place and open for review of fire safety components, such as:
 - a. Fire walls.
 - b. Vertical shafts.
 - c. Stairways.
 - d. Smoke stops.
 - e. Hazardous area separations.
 - f. Roof and ceiling assemblies.
 - g. Corridor and door widths.
 - h. HVAC systems.
 3. Do not install ceilings or other obstructing elements until 80% inspection is complete and accepted.
 4. Upon receipt of the Fire Marshal's report, the Contractor shall take the following actions:
 - a. Type Fire Marshal's handwritten report.
 - b. Review and respond in writing to each item in report indicating the status of item, proposed method of resolution, and time resolution will be complete.
 - c. Transmit copies of report and response to Design Professional.
 - d. Correct deficiencies indicated on the report.
- B. One Hundred Percent (100%) Inspection:
1. Notify State Fire Marshal and request inspection upon completion of 80% of the Project, providing a minimum of 21-day notice.
 2. 100% completion is defined as having the building ready to occupy and qualified for Certificate of Occupancy.
 3. Perform 100% inspection prior to occupancy of project.
 4. Upon receipt of the Fire Marshal's report, the Contractor shall take the following actions:
 - a. Type Fire Marshal's handwritten report.
 - b. Review and respond in writing to each item in report indicating the status of item, proposed method of resolution, and time resolution will be complete.
 - c. Transmit copies of report and response to Design Professional.
 - d. Correct deficiencies indicated on the report.
- C. Reinspection(s):
1. When documented deficiencies are corrected, notify the State Fire Marshal that the Project is ready for re-inspection.
 2. Upon receipt of the Fire Marshal's report, the Contractor shall take the following actions:
 - a. Type Fire Marshal's handwritten report.
 - b. Review and respond in writing to each item in report indicating the status of item, proposed method of resolution, and time resolution will be complete.
 - c. Transmit copies of report and response to Design Professional.
 - d. Correct deficiencies indicated on the report.

3. Repeat procedure until all deficiencies are corrected and Occupancy Permit is obtained.

3.3 Employment Eligibility Verification

- A. Pursuant to Georgia law O.C.G.A. 13-10-9 “Illegal Immigration Reform and Enforcement Act of 2011”, the Contractor shall not enter into contract for physical performance of services unless the subcontractor registers and participates in the Federal Work Authorization Program. Prior to allowing any work to begin with relations to this Contract, a signed affidavit form the Contractor is required to be submitted to the Owner and Design Professional.

END OF SECTION 01 41 00

NOTICE OF COMMENCEMENT

TO THE CLERK OF THE SUPERIOR COURT OF _____ COUNTY, GEORGIA

Pursuant to O.C.G.A. 44-14-361.5(b), the undersigned hereby gives Notice of Commencement of improvements to property including the following information:

1. Name, Address, and Telephone number of Contractor:

2. Name and Location of Project:

A legal description of the property upon which the improvements are being made is attached hereto as Exhibit "A", which is incorporated herein by this reference.

3. Name and address of true owner of property:

1. Name and address of person, other than true owner, at whose instance the improvements to the property are being made:

2. Name and address of Surety for the Performance and Payment Bonds, if any:

6. Name and address of Construction lender, if any:

The Clerk of the County is requested to file, record and index, this Notice of Commencement, in the records and indices maintained for such notices.

(Owner, Agent of Owner, Or Contractor)

Date _____

NOTICE OF COMMENCEMENT

TO THE CLERK OF THE SUPERIOR COURT OF _____ COUNTY, GEORGIA

Pursuant to O.C.G.A 44-14-361.5(b), the undersigned hereby gives Notice of Commencement of improvements to property including the following information:

- 1. Name, Address, and Telephone number of Contractor:

- 2. Name and Location of Project:

A legal description of the property upon which the improvements are being made is attached hereto as Exhibit "A", which is incorporated herein by this reference.

- 3. Name and address of true owner of property:

- 1. Name and address of person, other than true owner, at whose instance the improvements to the property are being made:

- 2. Name and address of Surety for the Performance and Payment Bonds, if any:

- 6. Name and address of Construction lender, if any:

The Clerk of the County is requested to file, record and index, this Notice of Commencement, in the records and indices maintained for such notices.

(Owner, Agent of Owner, Or Contractor)

Date _____

Contractor Affidavit under O.C.G.A. § 13-10-91(b)(1)

By executing this affidavit, the undersigned contractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services on behalf of (name of public employer) has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned contractor will continue to use the federal work authorization program throughout the contract period and the undersigned contractor will contract for the physical performance of services in satisfaction of such contract only with subcontractors who present an affidavit to the contractor with the information required by O.C.G.A. § 13-10-91(b). Contractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

Federal Work Authorization User Identification Number

Date of Authorization

Name of Contractor

Name of Project

Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, ____, 201__ in _____(city), _____(state).

Signature of Authorized Officer or Agent

Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____,201__.

NOTARY PUBLIC

My Commission Expires:

Subcontractor Affidavit under O.C.G.A. § 13-10-91(b)(3)

By executing this affidavit, the undersigned subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract with (name of contractor) on behalf of (name of public employer) has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the subcontractor with the information required by O.C.G.A. § 13-10-91(b). Additionally, the undersigned subcontractor will forward notice of the receipt of an affidavit from a sub-subcontractor to the contractor within five business days of receipt. If the undersigned subcontractor receives notice of receipt of an affidavit from any sub-subcontractor that has contracted with a sub-subcontractor to forward, within five business days of receipt, a copy of such notice to the contractor. Subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

Federal Work Authorization User Identification Number

Date of Authorization

Name of Subcontractor

Name of Project

Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.

Executed on _____, ____, 201__ in _____(city), _____(state).

Signature of Authorized Officer or Agent

Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____, 201__.

NOTARY PUBLIC

My Commission Expires:

Sub-subcontractor Affidavit under O.C.G.A. § 13-10-91(b)(4)

By executing this affidavit, the undersigned sub-subcontractor verifies its compliance with O.C.G.A. § 13-10-91, stating affirmatively that the individual, firm or corporation which is engaged in the physical performance of services under a contract for (name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract) and (name of contractor) on behalf of (name of public employer) has registered with, is authorized to use and uses the federal work authorization program commonly known as E-Verify, or any subsequent replacement program, in accordance with the applicable provisions and deadlines established in O.C.G.A. § 13-10-91. Furthermore, the undersigned sub-subcontractor will continue to use the federal work authorization program throughout the contract period and the undersigned sub-subcontractor will contract for the physical performance of services in satisfaction of such contract only with sub-subcontractors who present an affidavit to the sub-subcontractor with the information required by O.C.G.A. § 13-10-91(b). The undersigned sub-subcontractor shall submit, at the time of such contract, this affidavit to (name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract). Additionally, the undersigned sub-subcontractor will forward notice of the receipt of any affidavit from a sub-subcontractor to (name of subcontractor or sub-subcontractor with whom such sub-subcontractor has privity of contract). Sub-subcontractor hereby attests that its federal work authorization user identification number and date of authorization are as follows:

Federal Work Authorization User Identification Number

Date of Authorization

Name of Sub-subcontractor

Name of Project

Name of Public Employer

I hereby declare under penalty of perjury that the foregoing is true and correct.
Executed on _____, __, 201__ in _____(city), _____(state).

Signature of Authorized Officer or Agent

Printed Name and Title of Authorized Officer or Agent

SUBSCRIBED AND SWORN BEFORE ME
ON THIS THE _____ DAY OF _____, 201__.

NOTARY PUBLIC
My Commission Expires:

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Design Professional's action on Contractor's submittals, applications, and requests, "approved" is limited to Design Professional's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Design Professional. 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": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- 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.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if

bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
 - 1. For standards referenced by applicable building codes, comply with dates of standards as listed in building codes.
- 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.

1.4 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 in the following list. The information in this list is subject to change and is believed to be accurate as of the date of the Contract Documents.
 - 1. AABC - Associated Air Balance Council; www.aabc.com.
 - 2. AAMA - American Architectural Manufacturers Association; www.aamanet.org.
 - 3. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
 - 4. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
 - 5. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
 - 6. AGA - American Gas Association; www.aga.org.
 - 7. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); www.ahrinet.org.
 - 8. AI - Asphalt Institute; www.asphaltinstitute.org.
 - 9. AIA - American Institute of Architects (The); www.aia.org.
 - 10. AISC - American Institute of Steel Construction; www.aisc.org.
 - 11. AISI - American Iron and Steel Institute; www.steel.org.
 - 12. AMCA - Air Movement and Control Association International, Inc.; www.amca.org.
 - 13. ANSI - American National Standards Institute; www.ansi.org.
 - 14. APA - Architectural Precast Association; www.archprecast.org.
 - 15. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
 - 16. ARI - American Refrigeration Institute; (See AHRI).
 - 17. ASCE - American Society of Civil Engineers; www.asce.org.
 - 18. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
 - 19. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; www.ashrae.org.
 - 20. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
 - 21. ASSE - American Society of Sanitary Engineering; www.asse-plumbing.org.
 - 22. ASSP - American Society of Safety Professionals (The); www.assp.org.
 - 23. ASTM - ASTM International; www.astm.org.

24. ATIS - Alliance for Telecommunications Industry Solutions; www.atis.org.
25. AVIXA - Audiovisual and Integrated Experience Association; (Formerly: Infocomm International); www.soundandcommunications.com.
26. AWEA - American Wind Energy Association; www.awea.org.
27. AWS - American Welding Society; www.aws.org.
28. AWWA - American Water Works Association; www.awwa.org.
29. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
30. BIA - Brick Industry Association (The); www.gobrick.com.
31. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
32. CGA - Compressed Gas Association; www.cganet.com.
33. CIMA - Cellulose Insulation Manufacturers Association; www.cellulose.org.
34. CISCA - Ceilings & Interior Systems Construction Association; www.cisca.org.
35. CISPI - Cast Iron Soil Pipe Institute; www.cispi.org.
36. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
37. CPA - Composite Panel Association; www.compositepanel.org.
38. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
39. CRRC - Cool Roof Rating Council; www.coolroofs.org.
40. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
41. CSA - CSA Group; www.csa-group.org.
42. CSI - Construction Specifications Institute (The); www.csiresources.org.
43. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.coolingtechnology.org.
44. DASMA - Door and Access Systems Manufacturers Association; www.dasma.com.
45. DHA - Decorative Hardwoods Association; (Formerly: Hardwood Plywood & Veneer Association); www.decorativehardwoods.org.
46. DHI - Door and Hardware Institute; www.dhi.org.
47. ECA - Electronic Components Association; (See ECIA).
48. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
49. ECIA - Electronic Components Industry Association; www.eciaonline.org.
50. EIA - Electronic Industries Alliance; (See TIA).
51. EIMA - EIFS Industry Members Association; www.eima.com.
52. EJMA - Expansion Joint Manufacturers Association, Inc.; www.ejma.org.
53. EOS/ESD Association; (Electrostatic Discharge Association); www.esda.org.
54. ESTA - Entertainment Services and Technology Association; (See PLASA).
55. FM Approvals - FM Approvals LLC; www.fmglobal.com.
56. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
57. FSA - Fluid Sealing Association; www.fluidsealing.com.
58. GA - Gypsum Association; www.gypsum.org.
59. GANA - Glass Association of North America; (See NGA).
60. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
61. HPVA - Hardwood Plywood & Veneer Association; (See DHA).
62. IAS - International Accreditation Service; www.iasonline.org.
63. ICBO - International Conference of Building Officials; (See ICC).
64. ICC - International Code Council; www.iccsafe.org.
65. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
66. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
67. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
68. IEC - International Electrotechnical Commission; www.iec.ch.
69. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.

70. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
71. IESNA - Illuminating Engineering Society of North America; (See IES).
72. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
73. IGMA - Insulating Glass Manufacturers Alliance; www.igmaonline.org.
74. IGSHPA - International Ground Source Heat Pump Association; www.igshpa.org.
75. II - Infocomm International; (See AVIXA).
76. ILI - Indiana Limestone Institute of America, Inc.; www.iliai.com.
77. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
78. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
79. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
80. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
81. ISO - International Organization for Standardization; www.iso.org.
82. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
83. ITU - International Telecommunication Union; www.itu.int/home.
84. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
85. LMA - Laminating Materials Association; (See CPA).
86. LPI - Lightning Protection Institute; www.lightning.org.
87. MBMA - Metal Building Manufacturers Association; www.mbma.com.
88. MCA - Metal Construction Association; www.metalconstruction.org.
89. MFMA - Maple Flooring Manufacturers Association, Inc.; www.maplefloor.org.
90. MFMA - Metal Framing Manufacturers Association, Inc.; www.metalframingmfg.org.
91. MHIA - Material Handling Industry of America; www.mhia.org.
92. MIA - Marble Institute of America; (See NSI).
93. MMPA - Moulding & Millwork Producers Association; www.wmmpa.com.
94. MPI - Master Painters Institute; www.paintinfo.com.
95. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; www.mss-hq.org.
96. NAAMM - National Association of Architectural Metal Manufacturers; www.naamm.org.
97. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
98. NADCA - National Air Duct Cleaners Association; www.nadca.com.
99. NAIMA - North American Insulation Manufacturers Association; www.naima.org.
100. NALP - National Association of Landscape Professionals; www.landscapeprofessionals.org.
101. NBGQA - National Building Granite Quarries Association, Inc.; www.nbgqa.com.
102. NBI - New Buildings Institute; www.newbuildings.org.
103. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
104. NCMA - National Concrete Masonry Association; www.ncma.org.
105. NEBB - National Environmental Balancing Bureau; www.nebb.org.
106. NECA - National Electrical Contractors Association; www.necanet.org.
107. NeLMA - Northeastern Lumber Manufacturers Association; www.nelma.org.
108. NEMA - National Electrical Manufacturers Association; www.nema.org.
109. NETA - InterNational Electrical Testing Association; www.netaworld.org.
110. NFHS - National Federation of State High School Associations; www.nfhs.org.

111. NFPA - National Fire Protection Association; www.nfpa.org.
112. NFPA - NFPA International; (See NFPA).
113. NFRC - National Fenestration Rating Council; www.nfrc.org.
114. NGA - National Glass Association (The); (Formerly: Glass Association of North America); www.glass.org.
115. NHLA - National Hardwood Lumber Association; www.nhla.com.
116. NLGA - National Lumber Grades Authority; www.nlga.org.
117. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
118. NOMMA - National Ornamental & Miscellaneous Metals Association; www.nomma.org.
119. NRCA - National Roofing Contractors Association; www.nrca.net.
120. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
121. NSF - NSF International; www.nsf.org.
122. NSI - National Stone Institute; (Formerly: Marble Institute of America); www.naturalstoneinstitute.org.
123. NSPE - National Society of Professional Engineers; www.nspe.org.
124. NSSGA - National Stone, Sand & Gravel Association; www.nssga.org.
125. NTMA - National Terrazzo & Mosaic Association, Inc. (The); www.ntma.com.
126. NWFA - National Wood Flooring Association; www.nwfa.org.
127. PCI - Precast/Prestressed Concrete Institute; www.pci.org.
128. PDI - Plumbing & Drainage Institute; www.pdionline.org.
129. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
130. RCSC - Research Council on Structural Connections; www.boltcouncil.org.
131. RFCI - Resilient Floor Covering Institute; www.rfci.com.
132. RIS - Redwood Inspection Service; www.redwoodinspection.com.
133. SAE - SAE International; www.sae.org.
134. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
135. SDI - Steel Deck Institute; www.sdi.org.
136. SDI - Steel Door Institute; www.steeldoor.org.
137. SEFA - Scientific Equipment and Furniture Association (The); www.sefalabs.com.
138. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
139. SIA - Security Industry Association; www.siaonline.org.
140. SJI - Steel Joist Institute; www.steeljoist.org.
141. SMA - Screen Manufacturers Association; www.smainfo.org.
142. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
143. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
144. SPIB - Southern Pine Inspection Bureau; www.spib.org.
145. SPRI - Single Ply Roofing Industry; www.spri.org.
146. SRCC - Solar Rating & Certification Corporation; www.solar-rating.org.
147. SSINA - Specialty Steel Industry of North America; www.ssina.com.
148. SSPC - SSPC: The Society for Protective Coatings; www.sspc.org.
149. SWPA - Submersible Wastewater Pump Association; www.swpa.org.
150. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
151. TCNA - Tile Council of North America, Inc.; www.tileusa.com.
152. TEMA - Tubular Exchanger Manufacturers Association, Inc.; www.tema.org.

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153. TIA - Telecommunications Industry Association (The); (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.
 154. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
 155. TMS - The Masonry Society; www.masonrysociety.org.
 156. TPI - Truss Plate Institute; www.tpinst.org.
 157. UL - Underwriters Laboratories Inc.; www.ul.com.
 158. UNI - Uni-Bell PVC Pipe Association; www.uni-bell.org.
 159. USITT - United States Institute for Theatre Technology, Inc.; www.usitt.org.
 160. WA - Wallcoverings Association; www.wallcoverings.org.
 161. WASTEC - Waste Equipment Technology Association; www.wastec.org.
 162. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.
 163. WDMA - Window & Door Manufacturers Association; www.wdma.com.
 164. WI - Woodwork Institute; www.wicnet.org.
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. This information is believed to be accurate as of the date of the Contract Documents.
1. IAPMO - International Association of Plumbing and Mechanical Officials; www.iapmo.org.
 2. ICC - International Code Council; www.iccsafe.org.
 3. ICC-ES - ICC Evaluation Service, LLC; www.icc-es.org.
- C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Information is subject to change and is up to date as of the date of the Contract Documents.
1. COE - Army Corps of Engineers; www.usace.army.mil.
 2. CPSC - Consumer Product Safety Commission; www.cpsc.gov.
 3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
 4. DOD - Department of Defense; www.quicksearch.dla.mil.
 5. DOE - Department of Energy; www.energy.gov.
 6. EPA - Environmental Protection Agency; www.epa.gov.
 7. FAA - Federal Aviation Administration; www.faa.gov.
 8. FG - Federal Government Publications; www.gpo.gov/fdsys.
 9. GSA - General Services Administration; www.gsa.gov.
 10. HUD - Department of Housing and Urban Development; www.hud.gov.
 11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; www.eetd.lbl.gov.
 12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
 13. SD - Department of State; www.state.gov.
 14. TRB - Transportation Research Board; National Cooperative Highway Research Program; The National Academies; www.trb.org.
 15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
 16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.

17. USDOJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.
18. USP - U.S. Pharmacopeial Convention; www.usp.org.
19. USPS - United States Postal Service; www.usps.com.

D. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.

1. CFR - Code of Federal Regulations; Available from Government Printing Office; www.govinfo.gov.
2. DOD - Department of Defense; Military Specifications and Standards; Available from DLA Document Services; www.quicksearch.dla.mil.
3. DSCC - Defense Supply Center Columbus; (See FS).
4. FED-STD - Federal Standard; (See FS).
5. USAB - United States Access Board; www.access-board.gov.
6. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 45 00**QUALITY CONTROL**

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| PART 3 – EXECUTION | | |
| 3.1 | Examination | 01 45 00 –3 |
| 3.2 | Preparation | 01 45 00 –3 |

SECTION 01 45 00**QUALITY CONTROL****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Quality assurance – control of installation.
- B. Tolerances
- C. References and standards.
- D. Testing laboratory services.
- E. Manufacturer's field services.

1.2 RELATED SECTIONS

- A. Section 01 33 00 – Submittal Procedures: Submission of manufacturer's instructions and certificates.
- B. Section 01 45 23 – Testing and Inspecting Services.

1.3 QUALITY ASSURANCE – CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.
- B. Comply with manufacturer's instructions, including each step in sequence.
- C. Should manufacturer's instructions conflict with Contract Documents, request clarification from Engineer before proceeding
- D. Comply with specified standards as minimum quality for the Work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Perform Work by persons qualified to produce required and specified quality.
- F. Verify field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, or disfigurement.

1.4 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.

- B. Comply with manufacturer's tolerances. Should manufacturer's tolerances conflict with Contract Documents, request clarification from Architect/Engineer before proceeding
- C. Adjust products to appropriate dimensions and position before securing in place.
- D. Accessible routes shall not exceed maximum ADA allowable slopes.

1.5 REFERENCES AND STANDARDS

- A. For products or workmanship specified by association, trade, or other consensus standards, complies with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.
- B. Conform to reference standard by date of issue current with date specified in the individual specification sections, except where a specific date is established by code.
- C. Obtain copies of standards where required by product specification sections.
- D. Neither the contractual relationships, duties, nor responsibilities of the parties in Contract or those of the Architect/Engineer shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.6 TESTING SERVICES

- A. Owner will appoint, employ, and pay for services of an independent firm to perform testing. Contractor shall pay for retesting of failed tests.
- B. The independent firm will perform tests and other services specified in individual specification sections and as required by the Owner.
- C. Testing and source quality control may occur on or off the project site. Perform off-site testing as required by the Owner.
- D. Reports will be submitted by the independent firm to the Engineer and Contractor, in duplicate, indicating observations and results of tests and indicating compliance or non-compliance with Contract Documents.
- E. Cooperate with independent firm; furnish samples of materials, design mix, equipment, tools, storage, safe access, and assistance by incidental labor as requested.
 - 1. Notify Architect/Engineer and independent firm 48 hours prior to expected time for operations requiring services.
 - 2. Make arrangements with independent firm and pay for additional samples and tests required for Contractor's use.
- F. Testing does not relieve Contractor to perform Work to contract requirements.
- G. Re-testing required because of non-conformance to specified requirements shall be performed by the same independent firm on instructions by the Engineer. Payment for re-testing will be made by the Contractor.

1.7 MANUFACTURER'S FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, [start-up of equipment, test, adjust and balance of equipment as applicable, and to initiate instructions when necessary.
- B. Submit qualifications of observer to Architect/Engineer 15 days in advance of required observations. Observer subject to approval of Architect/Engineer and Owner.
- C. Report observations and site decisions or instructions given to applicators or installers supplemental or contrary to manufacturer's written instructions.
- D. Refer to Section 01 33 00 – SUBMITTAL PROCEDURES, MANUFACTURER'S FIELD REPORTS article.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION**3.1 EXAMINATION**

- A. Verify existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions.
- B. Verify existing substrate is capable of structural support or attachment of new Work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Verify utility services are available, of the correct characteristics, and in the correct locations.

3.2 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

END OF SECTION 01 45 00

SECTION 01 45 23**TESTING AND INSPECTING SERVICES**

| Paragraph | Title | Page |
|-------------------------|---------------------------------|-------------|
| PART 1 – GENERAL | | |
| 1.1 | Section Includes | 01 45 23-1 |
| 1.2 | Related Sections | 01 45 23-1 |
| 1.3 | References | 01 45 23-1 |
| 1.4 | Selection and Payment | 01 45 23-2 |
| 1.5 | Quality Assurance | 01 45 23-2 |
| 1.6 | Contractor Submittal | 01 45 23-2 |
| 1.7 | Testing Agency Responsibilities | 01 45 23-2 |
| 1.8 | Testing Agency Reports | 01 45 23-3 |
| 1.9 | Limits on Testing Authority | 01 45 23-3 |
| 1.10 | Contractor Responsibilities | 01 45 23-3 |
| 1.11 | Schedule of Tests | 01 45 23-4 |

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

SECTION 01 45 23**TESTING AND INSPECTING SERVICES****PART 1 – GENERAL****1.1 SECTION INCLUDES**

- A. Selection and payment.
- B. Contractor submittals.
- C. Testing agency responsibilities.
- D. Testing agency reports.
- E. Limits on testing authority.
- F. Contractor responsibilities.
- G. Schedule of tests.

1.2 RELATED SECTIONS

- A. Testing and acceptance required by public authorities.
- B. Section 01 33 00 – Submittal Procedures: Manufacturer's certificates.

1.3 REFERENCES (LATEST REVISION)

- A. ASTM C 802 – Practice for Conducting an Interlaboratory Test Program to Determine the Precision of Test Methods for Construction Materials.
- B. ASTM C 1077 – Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.
- C. ASTM C 1093 – Practice for Accreditation of Testing Agencies for Masonry.
- D. ASTM D 3740 – Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.
- E. ASTM D 4561 – Practice for Quality Control Systems for Organizations Producing and Applying Bituminous Paving Materials.
- F. ASTM E 329 – Specification for Agencies Engaged in Construction Inspection and/or Testing.
- G. ASTM E 543 – Practice for Agencies Performing Nondestructive Testing.
- H. ASTM E 548 – Guide for General Criteria Used for Evaluating Laboratory Competence.
- I. ASTM E 699 – Practice for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating of Building Components.

1.4 SELECTION AND PAYMENT

- A. Owner will employ and pay for services of an independent testing agency or laboratory to perform specified testing. Contractor shall pay for retesting of failed tests.
- B. Employment of testing agency or laboratory in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

1.5 QUALITY ASSURANCE

- A. Comply with requirements of practices listed in paragraph 1.3.
- B. Laboratory: Authorized to operate in State in which project is located.
- C. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.
- D. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards or accepted values of natural physical constants.

1.6 CONTRACTOR SUBMITTALS

- A. Prior to start of Work, submit testing laboratory name, address, and telephone number, and names of full time registered Engineer and responsible officer.
- B. Submit copy of report of laboratory facilities inspection made by Materials Reference Laboratory of National Bureau of Standards during most recent inspection, with memorandum of remedies of any deficiencies reported by the inspection.

1.7 TESTING AGENCY RESPONSIBILITIES

- A. Test samples of mixes submitted by Contractor.
- B. Provide qualified personnel at site. Cooperate with Engineer and Contractor in performance of services.
- C. Perform specified sampling and testing of products in accordance with specified standards.
- D. Ascertain compliance of materials and mixes with requirements of Contract Documents.
- E. Promptly notify Engineer and Contractor of observed irregularities or non-conformance of Work or products.
- F. Perform additional tests required by Engineer.
- G. Attend preconstruction meetings and progress meetings.

1.8 TESTING AGENCY REPORTS

- A. After each test, promptly submit two copies of report to Engineer and to Contractor.
- B. Include:

1. Date issued.
2. Project title and number.
3. Name of inspector.
4. Date and time of sampling or inspection.
5. Identification of product and specifications section.
6. Location in the Project.
7. Type of inspection or test.
8. Date of test.
9. Results of tests.
10. Conformance with Contract Documents.

C. When requested by Engineer, provide interpretation of test results.

1.9 LIMITS ON TESTING AUTHORITY

- A. Agency or laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.
- B. Agency or laboratory may not approve or accept any portion of the Work.
- C. Agency or laboratory may not assume any duties of Contractor.
- D. Agency or laboratory has no authority to stop the Work.

1.10 CONTRACTOR RESPONSIBILITIES

- A. Deliver to agency or laboratory at designated location, adequate samples of materials proposed to be used requiring testing, along with proposed mix designs.
- B. Cooperate with laboratory personnel, and provide access to the Work and to manufacturer's facilities.
- C. Provide incidental labor and facilities:
 1. To provide access to Work to be tested.
 2. To obtain and handle samples at the site or at source of products to be tested.
 3. To facilitate tests.
 4. To provide storage and curing of test samples.
- D. Notify Engineer and laboratory 48 hours prior to expected time for operations requiring testing services.
- E. Arrange with laboratory and pay for additional samples and tests required by Contractor beyond specified requirements.

1.11 SCHEDULE OF TESTS

| Section | Test | Frequency | Date | Performed By | Notes |
|--|--------------------------------|---|------|--------------|-------|
| 03 00 00 – Concrete | | | | | |
| | Mix Designs | 1 per mix design | | | |
| | Compressive Strength | 3 test cylinders for every 50 cubic yards or less of each mix design placed daily | | | |
| | | 1 cylinder broken at 7 days | | | |
| | | 2 cylinders broken at 28 days | | | |
| | Slump | 1 test for each set of cylinders taken | | | |
| 03 30 00 – Cast-in-Place Concrete | | | | | |
| | Materials | As necessary | | | |
| | Mix Designs | 1 per mix design | | | |
| | Strength | 4 Test Cylinders for each 50 cy or less or each mix design placed daily | | | |
| | Slump | 1 test per each set of cylinders | | | |
| | Air Content | 1 test per each set of cylinders | | | |
| | Temperature | 1 test per each set of cylinders | | | |
| 31 00 00 – Earthwork | | | | | |
| | Compaction | | | | |
| | Unpaved | 1 test per horizontal layer per 10,000 sf of fill area | | | |
| | Paved | 1 test per horizontal layer per 5,000 sf of subgrade | | | |
| | Building Pad | 1 test per horizontal layer per 1,500 sf of fill area | | | |
| | Curb & gutter | 1 test per 300 lf | | | |
| | Proof Rolling | As necessary | | | |
| 32 11 23 – Aggregate Base Courses | | | | | |
| | Base Density | 1 test per 5,000 sf | | | |
| 32 11 26 – Asphaltic Base Courses | | | | | |
| | Asphalt Extraction & Gradation | 1 test per each 250 tons placed | | | |
| | Marshall Stability | 1 test per each 250 tons placed | | | |
| | Core | 1 test for each 250 tons placed | | | |
| | Field Density | 1 test per 5,000 sf | | | |

| Section | Test | Frequency | Date | Performed By | Notes |
|---|---------------------------------|---|------|--------------|-------|
| 32 11 33 – Cement Treated Base Courses | | | | | |
| | Compressive Strength | 1 test per 5,000 sf | | | |
| | Base Density | 1 test per 5,000 sf | | | |
| 32 12 16 – Asphalt Paving | | | | | |
| | Asphalt Extraction & Gradation | 1 test for each 250 tons placed | | | |
| | Marshall Stability | 1 test for each 250 tons placed | | | |
| | Field Density | 1 test for each 250 tons placed | | | |
| | Cores | 1 test for each 250 tons placed | | | |
| 33 10 00 – Water Utilities | | | | | |
| | Hydrostatic & Leakage | 1.5 times the working pressure (no less than 150 psi). Conducted for 2 hours with maintained pressure of 150 psi (200 psi on fire main) | | | |
| | Bacteriological Samples | 2 taken 24 hours apart after disinfection | | | |
| | Compaction | | | | |
| | Traffic Areas | 1 per 100 lf or less for each 4 ft. of depth | | | |
| | Non-Traffic Areas | 1 per 500 lf or less for each 4 ft. of depth | | | |
| | Fire Flow | 1 per permit | | | |
| 33 30 00 – Sanitary Sewage Utilities | | | | | |
| | Start-up | Prior to acceptance of Pump Station | | | |
| | Drawdown | Prior to acceptance of Pump Station | | | |
| | Certification | Completion | | | |
| | Warranty | Completion | | | |
| | Television Inspection of Sewers | As requested | | | |
| | Leakage | As necessary | | | |
| | Compaction | | | | |
| | Traffic Areas | 1 per 100 lf or less for each 4 ft. of depth | | | |
| | Non-Traffic Areas | 1 per 500 lf or less for each 6 ft. of depth | | | |

| Section | Test | Frequency | Date | Performed By | Notes |
|--|--------------------------|--|------|--------------|-------|
| | Gravity – Air | [All lines] | | | |
| | Hydrostatic – Force Main | 100 psi for 2 hours | | | |
| | Deflection | 10% of system | | | |
| 33 40 00 – Storm Drainage Utilities | | | | | |
| | Compaction | | | | |
| | Traffic Areas | 1 per 100 lf or less for each 4 ft. of depth | | | |
| | Non-Traffic | 1 per 500 lf or less for each 6 ft. of depth | | | |

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

END OF SECTION 01 45 23

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 USE CHARGES

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

1.4 INFORMATIONAL SUBMITTALS

- A. Site Utilization Plan: Show temporary facilities, temporary utility lines and connections, staging areas, construction site entrances, vehicle circulation, and parking areas for construction personnel.

1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails. Provide concrete or galvanized-steel bases for supporting posts. Fencing shall be tied together and secure and not left in a manner where public access is allowed.
- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less in accordance with ASTM E84 and passing NFPA 701 Test Method 2.
- C. Dust-Control Adhesive-Surface Walk-Off Mats: Provide mats, minimum 36 by 60 inches.
- D. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading. Provide unit(s) of adequate size to serve needs of project, including jobsite progress meetings.
- B. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.
 - 1. Store combustible materials apart from building.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Heating, Cooling, and Dehumidifying 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.
 - 2. 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.

PART 3 - EXECUTION

3.1 TEMPORARY FACILITIES, GENERAL

- A. Conservation: Coordinate construction and use of temporary facilities with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

3.2 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 01 10 00 "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.

3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
 - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.
- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, safety shower and eyewash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- E. Temporary Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- F. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead or underground unless otherwise indicated.
- G. 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.
- H. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one land-based telephone line(s) for each field office.
1. At each telephone, post a list of important telephone numbers.
 - a. Police and fire departments.
 - b. Ambulance service.
 - c. Contractor's home office.
 - d. Contractor's emergency after-hours telephone number.
 - e. Design Professional's office.
 - f. Principal subcontractors' field and home offices.
- I. Electronic Communication Service: Provide secure WiFi wireless connection to internet with provisions for access by Design Professional and Owner.

3.4 SUPPORT FACILITIES INSTALLATION

- A. Comply with the following:
1. Provide construction for temporary field offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible in accordance with ASTM E136. Comply with NFPA 241.
 2. Maintain support facilities until Design Professional schedules Material Completion inspection. Remove before Material Completion. Personnel remaining after Material 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 on Drawings.
1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
- C. 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.
- D. Parking: Provide temporary parking areas for construction personnel.
- E. Storage and Staging: Use designated areas of Project site for storage and staging needs.

-
- 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 by Design Professional.
 2. Maintain and touch up signs, so they are legible at all times.
- H. Waste Disposal Facilities: Comply with requirements specified in Section 01 74 19 "Construction Waste Management and Disposal."
- I. 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 01 73 00 "Execution."
- J. 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.
- K. Temporary Elevator Use: See Division 14 elevator Section for temporary use of new elevators.
- L. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- M. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Material Completion.

3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
1. Comply with work restrictions specified in Section 01 10 00 "Summary."
- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.
- C. 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.

-
- D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- E. 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 Material Completion. Perform control operations lawfully, using materials approved by authorities having jurisdiction.
- F. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people 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 and Design Professional.
- G. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- H. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- I. Temporary 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 incomplete, insulate temporary enclosures.
- J. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
1. Prohibit smoking in construction areas. Comply with additional limits on smoking specified in other Sections.
 2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition in accordance with 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.

3.6 MOISTURE AND MOLD CONTROL

- A. Moisture and Mold Protection: Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
- B. Exposed Construction Period: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.
 - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 - 4. Remove standing water from decks.
 - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Period: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - 2. Keep interior spaces reasonably clean and protected from water damage.
 - 3. Periodically collect and remove waste containing cellulose or other organic matter.
 - 4. Discard or replace water-damaged material.
 - 5. Do not install material that is wet.
 - 6. Discard and replace stored or installed material that begins to grow mold.
 - 7. Perform work in a sequence that allows wet materials adequate time to dry before enclosing the material in gypsum board or other interior finishes.
- D. Controlled Construction Period: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - 2. Use temporary or permanent HVAC system to control humidity within ranges specified for installed and stored materials.
 - 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.

3.7 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 Material 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 Material Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 2. At Material Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 "Closeout Procedures."

END OF SECTION 01 50 00

SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.
- B. Related Requirements:
 - 1. Section 01 10 00 "Summary" for Contractor requirements related to Owner-furnished products.
 - 2. Section 01 21 00 "Allowances" for products selected under an allowance.
 - 3. Section 01 23 00 "Alternates" for products selected under an alternate.
 - 4. Section 01 25 00 "Substitution Procedures" for requests for substitutions.
 - 5. Section 01 42 00 "References" for applicable industry standards for products specified.
 - 6. Section 01 77 00 "Closeout Procedures" for submitting warranties.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Salvaged items or items reused from other projects are not considered new products. Items that are manufactured or fabricated to include recycled content materials are considered new products, unless indicated otherwise.
 - 3. Comparable Product: Product by named manufacturer that is demonstrated and approved through the comparable product submittal process described in Part 2 "Comparable Products" Article, 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 single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.
1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of basis-of-design product also establish salient characteristics of products for purposes of evaluating comparable products.
- C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
- D. Comparable Product Request Submittal: An action submittal requesting consideration of a comparable product, including the following information:
1. Identification of basis-of-design product or fabrication or installation method to be replaced, including Specification Section number and title and Drawing numbers and titles.
 2. Data indicating compliance with the requirements specified in Part 2 "Comparable Products" Article.
- E. Basis-of-Design Product Specification Submittal: An action submittal complying with requirements in Section 01 33 00 "Submittal Procedures."
- F. Substitution: Refer to Section 01 25 00 "Substitution Procedures" for definition and limitations on substitutions.
- 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.
- 1.5 COORDINATION
- A. Modify or adjust affected work as necessary to integrate work of approved comparable products and approved substitutions.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products, using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products on delivery to determine compliance with the Contract Documents and that products are undamaged and properly protected.
- C. Storage:
1. Provide a secure location and enclosure at Project site for storage of materials and equipment.
 2. Store products to allow for inspection and measurement of quantity or counting of units.
 3. Store materials in a manner that will not endanger Project structure.
 4. Store products that are subject to damage by the elements under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation and with adequate protection from wind.
 5. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 6. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 7. Protect stored products from damage and liquids from freezing.
 8. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. **Manufacturer's Warranty:** Written standard warranty form furnished by individual manufacturer for a particular product and issued in the name of the Owner or endorsed by manufacturer to Owner.
 2. **Special Warranty:** Written warranty required by the Contract Documents to provide specific rights for Owner and issued in the name of the Owner or endorsed by manufacturer to 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 in the Project Manual, prepare a written document, using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 77 00 "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 meeting requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Design Professional will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 6. Or Equal: For products specified by name and accompanied by the term "or equal," "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
 - a. Submit additional documentation required by Design Professional in order to establish equivalency of proposed products. Unless otherwise indicated, evaluation of "or equal" product status is by the Design Professional, whose determination is final.
- B. Product Selection Procedures:
1. Sole Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 2. Non-Limited List of Products: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed or an unnamed product that complies with requirements.

- a. Non-limited list of products is indicated by the phrase "Subject to compliance with requirements, available products that may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of an unnamed product is not considered a substitution, if the product complies with requirements.
3. Non-Limited List of Manufacturers: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed or a product by an unnamed manufacturer that complies with requirements.
- a. Non-limited list of manufacturers is indicated by the phrase "Subject to compliance with requirements, available manufacturers whose products may be incorporated in the Work include, but are not limited to, the following."
 - b. Provision of products of an unnamed manufacturer is not considered a substitution, if the product complies with requirements.
4. 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 may additionally indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- a. For approval of products by unnamed manufacturers, comply with requirements in Section 01 25 00 "Substitution Procedures" for substitutions for convenience.
- C. Visual Matching Specification: Where Specifications require the phrase "match Design Professional's sample," provide a product that complies with requirements and matches Design Professional's sample. Design Professional'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 01 25 00 "Substitution Procedures" for proposal of product.

2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration of Comparable Products: Design Professional will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Design Professional may return requests without action, except to record noncompliance with the following requirements:
1. Evidence that proposed product does not require revisions to the Contract Documents, is consistent with the Contract Documents, will produce the indicated results, and is compatible with other portions of the Work.
 2. Detailed comparison of significant qualities of proposed product with those of the named basis-of-design product. Significant product qualities include attributes, such as type,

- function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other specific features and requirements.
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 design professionals and owners, if requested.
 5. Samples, if requested.
- B. Design Professional's Action on Comparable Products Submittal: If necessary, Design Professional will request additional information or documentation for evaluation, as specified in Section 01 33 00 "Submittal Procedures."
1. Form of Approval of Submittal: As specified in Section 01 33 00 "Submittal Procedures."
 2. Use product specified if Design Professional does not issue a decision on use of a comparable product request within time allocated.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

CERTIFICATE OF MANUFACTURER

INSTRUCTIONS FOR PREPARATIONS OF CERTIFICATE: To be acceptable, the certificate must be prepared in the form indicated by this specimen on the official letterhead of the manufacturer. No portions of the certificate may be omitted. The owner needs only two originals of the certificate. One in operational manual and one in warranty account (closeout). If the equipment of a manufacturer is not installed in strict compliance with the recommendations of the manufacturer, or if in the design of the work the equipment is not applied in strict compliance with the recommendations of the manufacturer, a letter from the manufacturer should be forwarded to the Contractor (with copies to the Design Professional and the Owner) setting forth a list of the deviations from the recommendations of the manufacturer and stating what remains to be done in order to bring the work into strict compliance with the recommendations of the manufacturer. Prior to calling upon the representative of the manufacturer for performance of the services necessary to enable him to execute a certificate in accordance with this specimen, it is the obligation of the Contractor to have installed the work in strict compliance with the recommendation of the manufacturer and it is likewise the obligation of the Contractor to have put the equipment good operating condition in absolute and final readiness for the "start-up," "testing," and "placing into operation" as defined herein below by the representative of the manufacturer.

Date: _____

Insert name and address of Owner

Re: Certificate of (JOHN DOE CORPORATION) that equipment of components furnished by it has (or have, as the case may be) installed in strict compliance with its recommendations and is (or are, as the case may be) operating properly at PROJECT NO. _____

Gentlemen:

1. We certify through our duty authorized and acting agent that the item (or items, as the case may be) furnished by us to the Project named in the caption was (or were as the case may be) started up, tested, and placed in operation by authorized field representative on (enter the date on which the field representative performed the start-up, test, and placing into operation) and is (or are, as the case may be) operating properly:

(List the item or items furnished to the job. Show catalogue number or numbers.)

2. We certify further that the aforesaid equipment was installed in strict compliance with our recommendations as published by us in the following document (of documents, as the case may be):

(Insert the date, name, or other positive means of identifying the exact document or documents in which the recommendations for installation and use of the item of items are published.) (*)

3. A copy of the aforesaid document(s) is (are) attached hereto.

This _____ day of _____, 20_____

JOHN DOE CORPORATION

By: _____

Authorized Representative

(*) The date must be shown

DEFINITIONS:

1. "Start-up" is defined as putting the equipment into action.
2. "Testing" is defined as performing such testing as is stipulated in the Contract Documents to be performed.
3. "Placing into operation" is defined as operating the equipment for a sufficient period of time for the determination to be made that it is performing properly.

WARRANTY OF GENERAL CONTRACTOR

OWNER: _____

JOB NAME: _____

PROJECT NUMBER: _____

ADDRESS: _____

COUNTY OF: _____

STATE OF: _____

DATE: _____

_____ as General Contractor on the above project do hereby guarantee that all work executed under the plans and specifications will be free from defects of materials and workmanship for a period of:

Beginning at Substantial Completion Date and ending Two (2) YEARS from this date _____

and that all defects occurring within the warranty period shall be replaced or repaired at no cost to the Owner.

This guarantee covers all work as shown on the plans and specified in the Specifications and Contract Documents.

Nothing in the above shall be deemed to imply that this guarantee shall apply to any work which has been abused or neglected by the Owner.

Legal Name of Contractor:

By: _____

Title: _____

Notary Public

This _____ day of _____, 20 _____.

My commission expires _____

WARRANTY BY SUBCONTRACTOR TO GENERAL CONTRACTOR

GENERAL CONTRACTOR: _____

SUBCONTRACTOR: _____

OWNER: _____

JOB NAME: _____

PROJECT NUMBER: _____

ADDRESS: _____

COUNTY OF: _____

STATE OF: _____

DATE: _____

Subcontractor on the above project do hereby guarantee that all work executed under the plans and specifications will be free from defects of materials and workmanship .

Beginning at Substantial Completion Date and ending Two (2) YEARS from this date _____

and that all defects occurring within the warranty period shall be replaced or repaired at no cost to the Owner.

This guarantee covers all work as shown on the plans and specified in the Specifications and Contract Documents.

Nothing in the above shall be deemed to imply that this guarantee shall apply to any work which has been abused or neglected by the Owner.

Legal Name of Subcontractor:

By: _____

Title: _____

Notary Public

This _____ day of _____, 20 _____.

My commission expires _____

SPECIAL EXTENDED WARRANTY

OWNER: _____

JOB NAME: _____

PROJECT NUMBER: _____

ADDRESS: _____

COUNTY OF: _____

STATE OF: _____

DATE: _____

(insert name of PRIME WARRANTOR above and circle appropriate source below)
As (SUPPLIER) (MANUFACTURER) (SUBCONTRACTOR) on the above referenced project for:

(insert description of work or materials provided on the lines above)

and the General Contractor (co-signed below) do hereby guarantee that above executed under the criteria of the Contract Drawings and Specifications will be free from defects of materials and workmanship for a period of _____ YEARS (Three years or more)

Beginning _____, and ending _____,
(Substantial Completion Date)

and that all defects occurring within the warranty period shall be replaced or repaired at no cost to the Owner. This warranty covers all work as shown on the Contract Drawings and Contract Specifications with warranty criteria outline in Specification Section/Paragraph _____.
(insert the Technical Specification Section and Paragraph requiring the warranty)

Nothing in the above shall be deemed to imply that this guarantee shall apply to any work which has been abused or neglected by the Owner.

_____ Legal Name of Prime Warrantor

By (Officer) _____

By (Officer) _____

_____ Title

_____ Title:

Notary Public

This _____ day of _____, 20 _____.

My commission expires _____

SECTION 01 73 00 - EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work, including, but not limited to, the following:

1. Construction layout.
2. Field engineering and surveying.
3. Installation of the Work.
4. Cutting and patching.
5. Coordination of Owner's portion of the Work.
6. Coordination of Owner-installed products.
7. Progress cleaning.
8. Starting and adjusting.
9. Protection of installed construction.

- B. Related Requirements:

1. Section 01 10 00 "Summary" for coordination of , Owner's separate contracts, and limits on use of Project site.
2. Section 01 33 00 "Submittal Procedures" for submitting surveys.
3. Section 01 77 00 "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, replacing defective work, and final cleaning.
4. Section 07 84 13 "Penetration Firestopping" for patching penetrations in fire-rated construction.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.4 INFORMATIONAL 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.

1.5 CLOSEOUT SUBMITTALS

- A. Final Property Survey: Submit 10 copies showing the Work performed and record survey data.

1.6 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Comply with requirements specified in other Sections.
 - 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.
- 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 Design Professional for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.
- C. 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 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, gas service piping, 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.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility 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, submit a request for information to Design Professional in accordance with requirements in Section 01 31 00 "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 and existing conditions. If discrepancies are discovered, notify Design Professional promptly.
- B. Engage a land surveyor experienced in laying out the Work, using the following 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 Design Professional 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 Design Professional.
- 3.4 FIELD ENGINEERING
- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
- C. Benchmarks: Establish and maintain a minimum of four 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.
- D. 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.
- E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.

1. Recording: At Material Completion, have the final property survey recorded by or with authorities having jurisdiction as the official "property survey."

3.5 INSTALLATION

- A. 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. Install products at the time and under conditions that will ensure satisfactory results as judged by Design Professional. Maintain conditions required for product performance until Material Completion.
- D. Conduct construction operations, so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy of type expected for Project.
- E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on-site and placement in permanent locations.
- F. Tools and Equipment: Select tools or equipment that minimize production of excessive noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for Work specified to be factory prepared and field installed. Check Shop Drawings of other portions of the Work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions with manufacturer.
 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Design Professional.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

- I. Joints: Make joints of uniform width. Where joint locations in exposed Work are not indicated, arrange joints for the best visual effect, as judged by Design Professional. Fit exposed connections together to form hairline joints.
- J. Repair or remove and replace damaged, defective, or nonconforming Work.
 - 1. Comply with Section 01 77 00 "Closeout Procedures" for repairing or removing and replacing defective Work.

3.6 PROGRESS CLEANING

- A. Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Use containers intended for holding waste materials of type to be stored.
- 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: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Material Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Section 01 74 19 "Construction Waste Management and Disposal."
- 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 Material Completion.

- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.7 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 01 40 00 "Quality Requirements."

3.8 PROTECTION AND REPAIR OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Material Completion.
- B. Repair Work previously completed and subsequently damaged during construction period. Repair to like-new condition.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

END OF SECTION 01 73 00

SECTION 01 74 19 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
 - 1. Salvaging nonhazardous construction waste.
 - 2. Recycling nonhazardous construction waste.
 - 3. Disposing of nonhazardous construction waste.
- B. Related Requirements:
 - 1. Section 01 12 00 "Multiple Contract Summary" for coordination of responsibilities for waste management.
 - 2. Section 04 20 00 "Unit Masonry" for disposal requirements for masonry waste.
 - 3. Section 31 10 00 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.3 DEFINITIONS

- A. Construction Waste: Building, structure, and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.
- B. Demolition Waste: Building, structure, and site improvement materials resulting from demolition operations.
- C. Disposal: Removal of demolition or construction waste and subsequent salvage, sale, recycling, or deposit in landfill, incinerator acceptable to authorities having jurisdiction, or designated spoil areas on Owner's property.
- D. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- E. Salvage: Recovery of demolition or construction waste and subsequent sale or reuse in another facility.

- F. Salvage and Reuse: Recovery of demolition or construction waste and subsequent incorporation into the Work.

1.4 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 7 days of date established for the Proceed Order.

1.5 QUALITY ASSURANCE

- A. Waste Management Conference(s): Conduct conference(s) at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
 1. Review and discuss waste management plan including responsibilities of each contractor and waste management coordinator.
 2. Review requirements for documenting quantities of each type of waste and its disposition.
 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 5. Review waste management requirements for each trade.

1.6 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of construction waste generated by the Work. Use Form CWM-1 for construction waste. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
 1. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
 2. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
 3. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total nonhazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials. The Owner has established the following minimum goals for the following materials:
1. Recycle 75% of all metals.
 2. Reduce landfill waste disposal by 25%.

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
1. Comply with operation, termination, and removal requirements in Section 01 50 00 "Temporary Facilities and Controls."
- B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
1. Distribute waste management plan to everyone concerned within three days of submittal return.
 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged and recycled.
 2. Comply with Section 01 50 00 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

3.2 RECYCLING CONSTRUCTION WASTE

- A. Packaging:

1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
 2. Polystyrene Packaging: Separate and bag materials.
 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.
 - a. Comply with requirements in Section 32 93 00 "Plants" for use of clean ground gypsum board as inorganic soil amendment.
- C. Paint: Seal containers and store by type.

3.3 DISPOSAL OF WASTE

- A. General: Except for items or materials to be salvaged or recycled, remove waste materials from Project site and legally dispose of them in a landfill or incinerator acceptable to authorities having jurisdiction.
1. Except as otherwise specified, do not allow waste materials that are to be disposed of accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
- B. Burning: Do not burn waste materials.

END OF SECTION 01 74 19

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for Contract closeout, including, but not limited to, the following:
 - 1. Material Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
- B. Related Requirements:
 - 1. Section 01 29 00 "Payment Procedures" for requirements for Applications for Payment for Material Completion and Final Completion.
 - 2. Section 01 32 33 "Photographic Documentation" for submitting Final Completion construction photographic documentation.
 - 3. Section 01 78 23 "Operation and Maintenance Data" for additional operation and maintenance manual requirements.
 - 4. Section 01 78 39 "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.

1.3 DEFINITIONS

- A. List of Incomplete Items: Contractor-prepared list of items to be completed or corrected, prepared for the Design Professional's use prior to Design Professional's inspection, to determine if the Work is substantially complete.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of cleaning agent.
- B. Contractor's List of Incomplete Items: Initial submittal at Material Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.5 CLOSEOUT SUBMITTALS

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Schedule of Maintenance Material Items: For maintenance material submittal items required by other Sections.

1.7 MATERIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's "punch list"), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Material Completion: Complete the following a minimum of 5 days prior to requesting inspection for determining date of Material Completion. List items below that are incomplete at time of request.
 - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction, permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 2. Submit closeout submittals specified in other Division 01 Sections, including Project Record Documents, operation and maintenance manuals, damage or settlement surveys, property surveys, and similar final record information.
 - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Design Professional. Label with manufacturer's name and model number.
 - 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 Design Professional's signature for receipt of submittals.
 - 5. Submit testing, adjusting, and balancing records.
 - 6. Submit sustainable design submittals not previously submitted.
 - 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Material Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Material 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 Material 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 01 79 00 "Demonstration and Training."
 6. Advise Owner of changeover in utility services.
 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.
 10. Touch up paint and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Material Completion a minimum of 5 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Design Professional will either proceed with inspection or notify Contractor of unfulfilled requirements. Design Professional will prepare the Certificate of Material Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Design Professional, that must be completed or corrected before certificate will be issued.
1. Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
 2. Results of completed inspection will form the basis of requirements for Final Completion.

1.8 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 in accordance with Section 01 29 00 "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Design Professional's Material Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Design Professional. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit Final Completion photographic documentation.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 5 days prior to date the Work will be completed and ready for final inspection and tests. On receipt of request, Design Professional will either proceed with inspection or notify Contractor of unfulfilled requirements. Design Professional will prepare a final Certificate for Payment

after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

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

1.9 LIST OF INCOMPLETE ITEMS

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A.

1. Organize list of spaces in sequential order, proceeding from lowest floor to highest floor, listed by room or space number.
2. Organize items applying to each space by major element, including categories for ceilings, 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 Design Professional.
 - d. Name of Contractor.
 - e. Page number.
4. Submit list of incomplete items in the following format:
 - a. MS Excel Electronic File: Design Professional will return annotated file.

1.10 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Design Professional for designated portions of the Work where warranties are indicated to commence on dates other than date of Material Completion, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D. Warranty Electronic File: Provide warranties and bonds in PDF format. Assemble complete warranty and bond submittal package into a single electronic PDF file with bookmarks enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

1. Submit on digital media acceptable to Design Professional by uploading to web-based project software site and by email to Design Professional.

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 Material Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are not planted, mulched, or paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited-access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Clean flooring, removing debris, dirt, and staining; clean according to manufacturer's recommendations.
 - i. Vacuum and mop concrete.
 - j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.

- k. 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.
 - l. Remove labels that are not permanent.
 - m. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - p. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - 1) Clean HVAC system in compliance with NADCA ACR. Provide written report on completion of cleaning.
 - q. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
 - r. Clean strainers.
 - s. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste-disposal requirements in Section 01 74 19 "Construction Waste Management and Disposal."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations required by Section 01 73 00 "Execution" before requesting inspection for determination of Material Completion.

END OF SECTION 01 77 00

SECTION 01 78 23 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory manuals.
 - 2. Emergency manuals.
 - 3. Systems and equipment operation manuals.
 - 4. Systems and equipment maintenance manuals.
 - 5. Product maintenance manuals.
- B. Related Requirements:
 - 1. Section 01 33 00 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Submit operation and maintenance manuals indicated. Provide content for each manual as specified in individual Specification Sections, and as reviewed and approved at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Design Professional will comment on whether content of operation and maintenance submittals is acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operation and maintenance manuals in the following format:

1. Submit on digital media acceptable to Design Professional and by uploading to web-based project software site. Enable reviewer comments on draft submittals.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Design Professional will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Material Completion and at least 15 days before commencing demonstration and training. Design Professional will return copy with comments.
 1. Correct or revise each manual to comply with Design Professional's comments. Submit copies of each corrected manual within 15 days of receipt of Design Professional's comments and prior to commencing demonstration and training.
- E. Comply with Section 01 77 00 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

1.5 FORMAT OF OPERATION AND MAINTENANCE MANUALS

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

1.6 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization of Manuals: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 1. Title page.
 2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information:
 1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.

4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Design Professional.
 7. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

1.7 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY MANUAL

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals. List items and their location to facilitate ready access to desired information. Include the following:
1. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
 2. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
 3. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

1.8 EMERGENCY MANUALS

- A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
- B. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.

- C. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.
- D. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- E. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
 2. Shutdown instructions for each type of emergency.
 3. Operating instructions for conditions outside normal operating limits.
 4. Required sequences for electric or electronic systems.
 5. Special operating instructions and procedures.

1.9 SYSTEMS AND EQUIPMENT OPERATION MANUALS

- A. Systems and Equipment Operation Manual: Assemble a complete set of data indicating operation of each system, subsystem, and piece of equipment not part of a system. Include information required for daily operation and management, operating standards, and routine and special operating procedures.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- B. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor has delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.

10. License requirements including inspection and renewal dates.

C. Descriptions: Include the following:

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

D. Operating Procedures: Include the following, as applicable:

1. Startup procedures.
2. Equipment or system break-in procedures.
3. Routine and normal operating instructions.
4. Regulation and control procedures.
5. Instructions on stopping.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

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

F. Piped Systems: Diagram piping as installed, and identify color coding where required for identification.

1.10 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Systems and Equipment Maintenance Manuals: Assemble a complete set of data indicating maintenance of each system, subsystem, and piece of equipment not part of a system. Include manufacturers' maintenance documentation, preventive maintenance procedures and frequency, repair procedures, wiring and systems diagrams, lists of spare parts, and warranty information.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

B. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds as described below.

- C. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Manufacturers' Maintenance Documentation: Include the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins; include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - a. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 3. Identification and nomenclature of parts and components.
 4. List of items recommended to be stocked as spare parts.
- E. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
 2. Troubleshooting guide.
 3. Precautions against improper maintenance.
 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 5. Aligning, adjusting, and checking instructions.
 6. Demonstration and training video recording, if available.
- F. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- G. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- H. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.

- I. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.
- J. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of maintenance manuals.

1.11 PRODUCT MAINTENANCE MANUALS

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- C. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- D. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- E. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- F. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 23

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for Project Record Documents, including the following:
 - 1. Record Drawings.
 - 2. Record specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.
- B. Related Requirements:
 - 1. Section 01 73 00 "Execution" for final property survey.
 - 2. Section 01 77 00 "Closeout Procedures" for general closeout procedures.
 - 3. Section 01 78 23 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit copies of Record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit one paper-copy set(s) of marked-up record prints.
 - b. Final Submittal:
 - 1) Submit PDF electronic files of scanned Record Prints.
- 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: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

E. Reports: Submit written report weekly indicating items incorporated into Project Record Documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

1.4 RECORD DRAWINGS

A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.

1. Preparation: Mark record prints to show the actual installation, where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding photographic documentation.
2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Design Professional's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.

4. Mark record prints with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Material Completion, review marked-up record prints with Design Professional. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software program, version, and operating system as for the original Contract Drawings.
 2. Format: DWG, Version 2010, Microsoft Windows operating system.
 3. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 4. Refer instances of uncertainty to Design Professional for resolution.
 5. Design Professional will furnish Contractor with one set of digital data files of the Contract Drawings for use in recording information.
 - a. See Section 01 31 00 "Project Management and Coordination" for requirements related to use of Design Professional's digital data files.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Design Professional.
 - e. Name of Contractor.
- D. Newly Prepared Record Drawings: Prepare new drawings instead of preparing Record Drawings where the 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 the Architect for proper scale and scope of detailing and notations required to record the actual physical record drawings into the Record Drawings sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

1.5 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 and paper copy.

1.6 RECORD PRODUCT DATA

- A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and revisions to Project Record Documents as they occur; do not wait until end of Project.
- B. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, Record Specifications, and Record Drawings where applicable.
- C. Format: Submit Record Product Data as annotated PDF electronic file paper copy].
1. Include Record Product Data directory organized by Specification Section number and title, electronically linked to each item of Record Product Data.

1.7 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file and paper copy.

1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

1.8 MAINTENANCE OF RECORD DOCUMENTS

- A. Maintenance of Record Documents: Store Record Documents in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Design Professional's reference during normal working hours.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 78 39

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Instruction in operation and maintenance of systems, subsystems, and equipment.
 - 2. Demonstration and training video recordings.
- B. Allowances: Furnish demonstration and training instruction time under the demonstration and training allowance as specified in Section 01 21 00 "Allowances."
- C. Unit Price for Instruction Time: Length of instruction time will be measured by actual time spent performing demonstration and training in required location. No payment will be made for time spent assembling educational materials, setting up, or cleaning up. See requirements in Section 01 22 00 "Unit Prices."

1.3 INFORMATIONAL 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 using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Attendance Record: For each training module, submit list of participants and length of instruction time.
- C. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 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 Contractor.
 - f. Date of video recording.
 2. Transcript: Prepared and bound in format matching operation and maintenance manuals. 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. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
 4. At completion of training, submit complete training manual(s) for Owner's use prepared in same PDF file format required for operation and maintenance manuals specified in Section 01 78 23 "Operation and Maintenance Data."

1.5 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 01 40 00 "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 01 31 00 "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.

1.6 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- 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 have been reviewed and approved by Architect.

1.7 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. Systems and equipment operation manuals.
 - c. Systems and equipment maintenance manuals.
 - d. Product maintenance manuals.
 - e. Project Record Documents.
 - f. Identification systems.
 - g. Warranties and bonds.
 - h. 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.

1.8 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 01 78 23 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

1.9 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 Construction Manager, with at least seven days' advance notice.
- D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
- 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.

1.10 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. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD modewith vibration reduction technology.
1. Submit video recordings by uploading to web-based Project software site.
 2. File Hierarchy: Organize folder structure and file locations according to Project Manual table of contents. Provide complete screen-based menu.
 3. File Names: Utilize file names based on name of equipment generally described in video segment, as identified in Project specifications.
 4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the equipment demonstration and training recording that describes the following for each Contractor involved on the Project, arranged according to Project Manual table of contents:
 - a. Name of Contractor/Installer.
 - b. Business address.
 - c. Business phone number.
 - d. Point of contact.
 - e. Email address.
- C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
1. Film training session(s) in segments not to exceed 15 minutes.
 - a. Produce segments to present a single significant piece of equipment per segment.
 - b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
 - c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.
- D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
1. Furnish additional portable lighting as required.
- E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.
- F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
- G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS

PART 3 - EXECUTION

END OF SECTION 01 79 00

SECTION 02 41 00**SITE DEMOLITION****PART 1 - GENERAL****1.1 SUMMARY**

Work under this section includes requirements for removal of reinforced concrete and asphalt pavement, fencing, light poles and associated overhead power lines, removal of abandoned utility systems, demolition of buildings, removal of materials and equipment to be salvaged, revised or discarded, and other miscellaneous and incidental items and removals as they relate to the work for this project. The Contractor shall furnish all labor, equipment and utilities to complete the work as indicated on the project drawing and as specified herein.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A10.6 (1990; R 1998) Safety Requirements for Demolition Operations

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE EM 385-1-1 (2003) Safety -- Safety and Health Requirements

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 61-SUBPART M National Emission Standard for Asbestos

1.3 GENERAL REQUIREMENTS

Do not begin demolition until authorization is received from the Owner. The work includes demolition, salvage of identified items and materials, and removal of resulting rubbish and debris. Remove rubbish and debris from property daily, unless otherwise directed. Materials that cannot be removed daily shall be stored in areas specified by the Owner/Engineer. In the interest of occupational safety and health, perform the work in accordance with COE EM 385-1-1, Section 23, Demolition, and other applicable Sections.

- 1.3.1 The Contractor shall be responsible for visiting and examining the project site to assess the extent of demolition, removal and general work to be done.

1.4 SUBMITTALS

The following shall be submitted in accordance with Section 01300, "Submittals."

1.4.1 Statements

- A. Demolition Plan

Submit proposed demolition and removal procedures for approval before work is started. The existing structure is considered to have an HREC and the building materials must be properly characterized by qualified personnel in the area of methamphetamine laboratories (provided by the Contractor) prior to removal from the site. Include statements affirming a Contractor inspection of the existing structure and its' components and its' suitability to perform as a safe working platform or if inspection reveals a safety hazard to workers, state provisions for securing the safety of the workers throughout the performance of the work. Provide procedures for safe conduct of the work in accordance with COE EM 385-1-1.

1.4.2 Certificates

A. Notifications

Furnish timely notification of demolition projects to State, regional, and local authorities in accordance with 40 CFR 61-SUBPART M. Notify the State's environmental protection agency and the Owner in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61-SUBPART M. Contractor shall complete and submit Georgia Environmental Protection Division (EPD) Form 083005F for the building demolition, noting the HREC. The Contractor is responsible for paying all fees in association with the building demolition, including asbestos abatement, as applicable. Contractor shall coordinate completion of the form prior to submittal with the Owner. Information related to asbestos abatement, as applicable, can be found here:

https://epd.georgia.gov/sites/epd.georgia.gov/files/related_files/site_page/ASBPNREV083005.pdf

1.5 REGULATORY AND SAFETY REQUIREMENTS

Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ANSI A10.6.

1.6 DUST AND DEBRIS CONTROL

Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution.

1.7 PROTECTION

1.7.1 Traffic Control Signs

Where pedestrian and driver safety is endangered in the area of removal work, mark all hazards with signs, traffic barricades and flagmen as necessary to warn of construction work in progress. Anchor barricades in a manner to prevent displacement by wind. The Contractor shall be responsible for any damage caused by his operations. Notify the Owner prior to beginning such work.

1.7.2 Items to Remain in Place

Take necessary precautions to avoid damage to existing items to remain in place, to be reused, or to remain the property of the Owner. Repair or replace damaged items as approved by the Owner/Engineer. Coordinate the work of this section with all other work indicated. Construct and

maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, or demolition work performed under this contract. Do not overload pavements to remain. Repairs, reinforcement, or structural replacement require approval by the Owner/Engineer prior to performing such work.

1.7.3 Existing Construction

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove dust, dirt, and debris from work areas daily.

1.7.4 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition operations.

1.7.5 Debris Removal and Disposal

The Contractor shall be responsible for gathering, loading and disposing of all deleterious material in accordance with local, State, and Federal regulations.

1.7.6 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. Floors, roofs, walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, must remain standing without additional bracing, shoring, or lateral support until demolished, unless directed otherwise by the Owner. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, or demolition work performed under this contract.

1.7.7 Protection of Personnel

Before, during and after the demolition work the Contractor shall continuously evaluate the condition of the structure being demolished and take immediate action to protect all personnel working in and around the demolition site.

1.7.8 Work

Assume responsibility for all demolition work and protection of demolition work. Provide additional grading, as necessary, to prevent damage to demolition work by water (surface runoff) at no additional cost to the Owner.

1.8 BURNING

The use of burning at the project site for the disposal of refuse and debris must comply with local and State regulations, and must be approved by the Owner.

1.9 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Items to be relocated which are damaged by the Contractor shall be repaired or replaced with new undamaged items as approved by the Owner/Engineer.

1.10 ENVIRONMENTAL PROTECTION

Comply with all local, state and federal environmental protection requirements and with the requirements of Section "Environmental, Safety & Health," located elsewhere in the document.

1.11 USE OF EXPLOSIVES

Use of explosives will not be permitted.

1.12 BUILDING DEMOLITION

Contractor is responsible for ensuring the qualifications of the person/company responsible for demolition. Person/company should have demonstrated experience with building removal in the State of Georgia.

PART 2 - PRODUCTS**2.1 EQUIPMENT**

A. Choice of equipment to perform specified operations is the responsibility of the Contractor.

B. When performing work after daylight hours:

- (1) Obtain written approval from the Owner.
- (2) Provide and maintain sufficient artificial lighting to permit proper demolition work, observation, and inspection.

2.2 FILL MATERIAL

Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill voids, depressions or excavations resulting from demolition of structures. See Section "Earthwork," found elsewhere in the document.

PART 3 - EXECUTION**3.1 EXISTING FACILITIES TO BE REMOVED****3.1.1 Structures**

Remove existing structures indicated to be removed.

3.1.2 Utilities and Related Equipment**3.1.2.1 General Requirements**

Do not interrupt existing utilities serving facilities occupied and used by the Owner except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

3.1.2.2 Disconnecting Existing Utilities

Remove existing utilities, as indicated and terminate in a manner conforming to the nationally recognized code covering the specific utility and approved by the Owner/Engineer. When utility lines are encountered that are not indicated on the drawings, the Owner shall be notified prior to further work in that area. Remove meters and related equipment and deliver to a location in accordance with instructions of the Owner.

3.1.3 Paving and Concrete Slabs

Remove concrete and asphaltic concrete paving and slabs as indicated. Provide and maintain neat sawcuts at limits of pavement removal as indicated.

3.2 CONCURRENT EARTH-MOVING OPERATIONS

Do not begin excavation, filling, and other earth-moving operations that are sequential to demolition work in areas occupied by structures to be demolished until all demolition in the area has been completed and debris removed. Holes, open basements and other hazardous openings shall be filled.

3.3 DISPOSITION OF MATERIAL

3.3.1 Title to Materials

Except for salvaged items specified in related Sections, and for materials or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, shall become the property of the Contractor and shall be removed from the site. Title to materials resulting from demolition, and materials and equipment to be removed, is vested in the Contractor upon approval by the Owner of the Contractor's Demolition Plan, and authorization by the Owner to begin demolition. The Owner will not be responsible for the condition or loss of, or damage to, such property after contract award. Materials and equipment shall not be viewed by prospective purchasers or sold on the site.

3.3.2 Reuse of Materials and Equipment

Remove and store materials and equipment listed and indicated to be reused or relocated to prevent damage, and reinstall as the work progresses.

3.4 CLEANUP

Debris and rubbish shall be removed from basement and similar excavations. Debris shall be removed and transported in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.5 DISPOSAL OF REMOVED MATERIALS

3.5.1 Disposal General

Dispose of debris, rubbish, scrap, and other non-salvageable materials resulting from removal operations with all applicable federal, state and local regulations as contractually specified. Removed materials shall not be stored on the project site.

3.5.2 Burning on Owner Property

Burning of materials removed from demolished structures will not be permitted.

3.5.3 Removal from Owner Property

Transport waste materials removed from demolished structures from property for legal disposal.

End of Section 02 41 00

SECTION 03 20 00 - CONCRETE REINFORCING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

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

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Each type of steel reinforcement.
2. Bar supports.
3. Mechanical splice couplers.

B. Shop Drawings: Comply with ACI SP-066:

1. Include placing drawings that detail fabrication, bending, and placement.
2. Include bar sizes, lengths, materials, grades, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports for concrete reinforcement.

C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.

1. Location of construction joints is subject to approval of the Architect.

1.4 INFORMATIONAL SUBMITTALS

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

1. Steel Reinforcement:
 - a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706/A706M.
2. Mechanical splice couplers.

B. Field quality-control reports.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60 , deformed.
- B. Plain-Steel Welded-Wire Reinforcement: ASTM A1064/A1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.2 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place.
 - 1. Manufacture bar supports from steel wire, plastic, or precast concrete in accordance with CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - a. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire, all-plastic bar supports, or CRSI Class 2 stainless steel bar supports.
- B. Mechanical Splice Couplers: ACI 318 Type 1 , same material of reinforcing bar being spliced; tension-compression type mechanical-lap type.
- C. Steel Tie Wire: ASTM A1064/A1064M, annealed steel, not less than 0.0508 inch in diameter.
 - 1. Finish: Plain .

2.3 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protection of In-Place Conditions:
 - 1. Do not cut or puncture vapor retarder.
 - 2. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for placing and supporting reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement.
 - 1. Locate and support reinforcement with bar supports to maintain minimum concrete cover.
 - 2. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than 1 inch, not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318.
- E. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
 - 1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 48 bar diameters at splices, or 24 inches, whichever is greater.
 - 2. Stagger splices in accordance with ACI 318.
 - 3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
- G. Install welded-wire reinforcement in longest practicable lengths.
 - 1. Support welded-wire reinforcement in accordance with CRSI "Manual of Standard Practice."
 - a. For reinforcement less than W4.0 or D4.0, continuous support spacing shall not exceed 12 inches.
 - 2. Lap edges and ends of adjoining sheets at least one wire spacing plus 2 inches for plain wire and 8 inches for deformed wire.
 - 3. Offset laps of adjoining sheet widths to prevent continuous laps in either direction.
 - 4. Lace overlaps with wire.

3.3 JOINTS

- A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 - 1. Place joints perpendicular to main reinforcement.
 - 2. Continue reinforcement across construction joints unless otherwise indicated.
 - 3. Do not continue reinforcement through sides of strip placements of floors and slabs.

3.4 INSTALLATION TOLERANCES

- A. Comply with ACI 117.

3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare test reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
 - 1. Steel-reinforcement placement.
 - 2. Steel-reinforcement mechanical splice couplers.

END OF SECTION 03 20 00

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 03 20 00 "Concrete Reinforcing" for steel reinforcing bars and welded-wire reinforcement.
2. Section 31 20 00 "Earth Moving" for drainage fill under slabs-on-ground.

1.2 DEFINITIONS

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

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

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

1.4 ACTION SUBMITTALS

- A. Product Data: For each of the following.

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Aggregates.
5. Admixtures:
 - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
6. Vapor retarders.

7. Curing materials.
8. Joint fillers.

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

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
10. Intended placement method.
11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - a. Location of construction joints is subject to approval of the Architect.

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

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

1.5 INFORMATIONAL SUBMITTALS

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

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Vapor retarders.
5. Joint-filler strips.

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

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Aggregates.
5. Admixtures:

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301.

1.8 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 and ACI 306.1.
- B. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

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

2.2 CONCRETE MATERIALS

- A. Cementitious Materials:
1. Portland Cement: ASTM C150/C150M, Type I/II, gray.
 2. Fly Ash: ASTM C618, Class C or F.
 3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C33/C33M, Class 1N coarse aggregate or better, graded. Provide aggregates from a single source.

1. Alkali-Silica Reaction: Comply with one of the following:
 - a. Expansion Result of Aggregate: Not more than 0.04 percent at one-year when tested in accordance with ASTM C1293.
 - b. Expansion Results of Aggregate and Cementitious Materials in Combination: Not more than 0.10 percent at an age of 16 days when tested in accordance with ASTM C1567.
 - c. Alkali Content in Concrete: Not more than 4 lb./cu. yd. for moderately reactive aggregate or 3 lb./cu. yd. for highly reactive aggregate, when tested in accordance with ASTM C1293 and categorized in accordance with ASTM C1778, based on alkali content being calculated in accordance with ACI 301.
 2. Maximum Coarse-Aggregate Size: 1 inch nominal.
 3. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Air-Entraining Admixture: ASTM C260/C260M.
- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride .
1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
 2. Retarding Admixture: ASTM C494/C494M, Type B.
 3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
 6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- E. Water and Water Used to Make Ice: ASTM C94/C94M, potable
- 2.3 VAPOR RETARDERS
- A. Sheet Vapor Retarder, Class A: ASTM E1745, Class A; not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.
- 2.4 CURING MATERIALS
- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Moisture-Retaining Cover: ASTM C171, polyethylene film burlap-polyethylene sheet.
1. Color:
 - a. Ambient Temperature Below 50 deg F: Black.
 - b. Ambient Temperature between 50 deg F and 85 deg F: Any color.
 - c. Ambient Temperature Above 85 deg F: White.
- C. Water: Potable or complying with ASTM C1602/C1602M.

- D. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.
- E. Clear, Waterborne, Membrane-Forming, Curing and Sealing Compound: ASTM C1315, Type 1, Class A.

2.5 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.

2.6 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, in accordance with ACI 301.
 - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash or Other Pozzolans: 25 percent by mass.
 - 2. Slag Cement: 50 percent by mass.
 - 3. Total of Fly Ash or Other Pozzolans, Slag Cement: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass.
 - 4. Total of Fly Ash or Other Pozzolans: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
 - 1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, and concrete with a w/cm below 0.50.

2.7 CONCRETE MIXTURES

- A. Class A: Normal-weight concrete used for footings.
 - 1. Exposure Class: ACI 318 F1.
 - 2. Minimum Compressive Strength: 3000 psi at 28 days.
 - 3. Maximum w/cm: 0.60.

4. Slump Limit: 5 inches, plus or minus 1 inch or 8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches plus or minus 1 inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.
 5. Air Content:
 - a. Exposure Class F1: 4.5 percent, plus or minus 1.5 percent at point of delivery for concrete containing 1-inch nominal maximum aggregate size.
 6. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.
- B. Class C : Normal-weight concrete used for interior slabs-on-ground.
1. Exposure Class: ACI 318 S1.
 2. Minimum Compressive Strength: 3000 psi at 28 days.
 3. Maximum w/cm: 0.60.
 4. Minimum Cementitious Materials Content: 520 lb/cu. yd. .
 5. Slump Limit: 5 inches, plus or minus 1 inch or 8 inches, plus or minus 1 inch for concrete with verified slump of 3 inches plus or minus 1 inch before adding high-range water-reducing admixture or plasticizing admixture.
 6. Air Content:
 - a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished floors.
 7. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.
- C. Class F : Normal-weight concrete used for concrete toppings.
1. Exposure Class: ACI 318 F0.
 2. Minimum Compressive Strength: 3000 psi at 28 days.
 3. Slump Limit: 5 inches, plus or minus 1 inch.
 4. Air Content: 0 percent, plus or minus 0.5 percent at point of delivery.
 5. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.
 - a. Do not use an air-entraining admixture or allow total air content to exceed 3 percent for concrete used in trowel-finished toppings.
- D. Class I : Normal-weight concrete used for interior suspended slabs and interior metal pan stairs and landings:
1. Exposure Class: ACI 318 F0 .
 2. Minimum Compressive Strength: 3000 psi at 28 days.
 3. Maximum w/cm: 0.60 .
 4. Minimum Cementitious Materials Content: 470 lb/cu. yd..
 5. Maximum Size Aggregate: 1/2 inch.
 6. Slump Limit: 3 inches, plus 1 inch or minus 2 inches.
 7. Air Content: 0 percent, plus or minus 0.5 percent at point of delivery.
 8. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.
 9. Retarding Admixture: Not allowed.
 10. Accelerating Admixture: Not allowed.

2.8 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and ASTM C1116/C1116M, and furnish batch ticket information.

PART 3 - EXECUTION

3.1 INSTALLATION OF EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining Work that is attached to or supported by cast-in-place concrete.
 - 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.
 - 3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

3.2 INSTALLATION OF VAPOR RETARDER

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder in accordance with ASTM E1643 and manufacturer's written instructions.
 - 1. Install vapor retarder with longest dimension parallel with direction of concrete pour.
 - 2. Face laps away from exposed direction of concrete pour.
 - 3. Lap vapor retarder over footings and grade beams not less than 6 inches, sealing vapor retarder to concrete.
 - 4. Lap joints 6 inches and seal with manufacturer's recommended tape.
 - 5. Terminate vapor retarder at the top of floor slabs, grade beams, and pile caps, sealing entire perimeter to floor slabs, grade beams, foundation walls, or pile caps.
 - 6. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
 - 7. Protect vapor retarder during placement of reinforcement and concrete.
 - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

3.3 JOINTS

- A. Construct joints true to line, with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Coordinate with floor slab pattern and concrete placement sequence.
 - 1. Install so strength and appearance of concrete are not impaired, at locations indicated on Drawings or as approved by Architect.

2. Place joints perpendicular to main reinforcement.
 - a. Continue reinforcement across construction joints unless otherwise indicated.
 - b. Do not continue reinforcement through sides of strip placements of floors and slabs.
 3. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 4. Locate joints for beams, slabs, joists, and girders at third points of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 6. Space vertical joints in walls as indicated on Drawings . Unless otherwise indicated on Drawings, locate vertical joints beside piers integral with walls, near corners, and in concealed locations where possible.
- C. Control Joints in Slabs-on-Ground: Form weakened-plane control joints, sectioning concrete into areas as indicated. Construct control joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form control joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of control joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 2. Sawed Joints: Form control joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random cracks.
- D. Isolation Joints in Slabs-on-Ground: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated on Drawings.
 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface, where joint sealants, specified in Section 07 92 00 "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.4 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
 2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.

- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301, but not to exceed the amount indicated on the concrete delivery ticket.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness.
 - 1. If a section cannot be placed continuously, provide construction joints as indicated.
 - 2. Deposit concrete to avoid segregation.
 - 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301.
 - a. Do not use vibrators to transport concrete inside forms.
 - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer.
 - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
 - d. At each insertion, limit duration of vibration to time necessary to consolidate concrete, and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- F. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Do not place concrete floors and slabs in a checkerboard sequence.
 - 2. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 3. Maintain reinforcement in position on chairs during concrete placement.
 - 4. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 5. Level concrete, cut high areas, and fill low areas.
 - 6. Slope surfaces uniformly to drains where required.
 - 7. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface.
 - 8. Do not further disturb slab surfaces before starting finishing operations.

3.5 FINISHING FORMED SURFACES

A. As-Cast Surface Finishes:

1. ACI 301 Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
 - a. Patch voids larger than 1-1/2 inches wide or 1/2 inch deep.
 - b. Remove projections larger than 1 inch.
 - c. Tie holes do not require patching.
 - d. Surface Tolerance: ACI 117 Class D.
 - e. Apply to concrete surfaces not exposed to public view .
2. ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams.
 - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
 - b. Remove projections larger than 1/4 inch.
 - c. Patch tie holes.
 - d. Surface Tolerance: ACI 117 Class B.
 - e. Locations: Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete .
3. ACI 301 Surface Finish SF-3.0:
 - a. Patch voids larger than 3/4 inch wide or 1/2 inch deep.
 - b. Remove projections larger than 1/8 inch.
 - c. Patch tie holes.
 - d. Surface Tolerance: ACI 117 Class A.
 - e. Locations: Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete .

B. Related Unformed Surfaces:

1. At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a color and texture matching adjacent formed surfaces.
2. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.6 FINISHING FLOORS AND SLABS

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

B. Scratch Finish:

1. While still plastic, texture concrete surface that has been screeded and bull-floated or darbied.
2. Use stiff brushes, brooms, or rakes to produce a profile depth of 1/4 inch in one direction.

3. Apply scratch finish to surfaces to receive concrete floor toppings to receive mortar setting beds for bonded cementitious floor finishes .

C. Float Finish:

1. When bleedwater sheen has disappeared and concrete surface has stiffened sufficiently to permit operation of specific float apparatus, consolidate concrete surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats.
2. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
3. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo .

D. Trowel Finish:

1. After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel.
2. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance.
3. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
4. Do not add water to concrete surface.
5. Do not apply hard-troweled finish to concrete, which has a total air content greater than 3 percent.
6. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system .
7. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch .

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated on Drawings . While concrete is still plastic, slightly scarify surface with a fine broom perpendicular to main traffic route.

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

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

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

3.7 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
 2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
 3. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:
1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 2. Construct concrete bases 6 inches high unless otherwise indicated on Drawings, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated on Drawings, or unless required for seismic anchor support.
 3. Minimum Compressive Strength: 3000 psi at 28 days.
 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
 6. Prior to pouring concrete, place and secure anchorage devices.
 - a. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - b. Cast anchor-bolt insert into bases.
 - c. Install anchor bolts to elevations required for proper attachment to supported equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items.
1. Cast-in inserts and accessories, as shown on Drawings.
 2. Screed, tamp, and trowel finish concrete surfaces.
- 3.8 CONCRETE CURING
- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
1. Comply with ACI 301 and ACI 306.1 for cold weather protection during curing.
 2. Comply with ACI 301 and ACI 305.1 for hot-weather protection during curing.
 3. Maintain moisture loss no more than 0.2 lb/sq. ft. x h before and during finishing operations.
- B. Curing Formed Surfaces: Comply with ACI 308.1 as follows:
1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
 2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.

3. If forms remain during curing period, moist cure after loosening forms.
 4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
 - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
 - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
 - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
 - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
 - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
 - 2) Maintain continuity of coating and repair damage during curing period.
- C. Curing Unformed Surfaces: Comply with ACI 308.1 as follows:
1. Begin curing immediately after finishing concrete.
 2. Interior Concrete Floors:
 - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12-inches.
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
 - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - b) Cure for not less than seven days.
 - 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
 - b. Floors to Receive Penetrating Liquid Floor Treatments: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12 inches.
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.

- 2) Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive.
 - a) Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
 - b) Cure for not less than seven days.
- 3) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- c. Floors to Receive Polished Finish: Contractor has option of the following:
 - 1) Absorptive Cover: As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - a) Lap edges and ends of absorptive cover not less than 12 inches.
 - b) Maintain absorptive cover water saturated, and in place, for duration of curing period, but not less than seven days.
 - 2) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:
 - a) Water.
 - b) Continuous water-fog spray.
- d. Floors to Receive Chemical Stain:
 - 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install curing paper over entire area of floor.
- e. Floors to Receive Urethane Flooring:
 - 1) As soon as concrete has sufficient set to permit application without marring concrete surface, install prewetted absorptive cover over entire area of floor.
 - 2) Rewet absorptive cover, and cover immediately with polyethylene moisture-retaining cover with edges lapped 6 inches and sealed in place.
 - 3) Secure polyethylene moisture-retaining cover in place to prohibit air from circulating under polyethylene moisture-retaining cover.
 - 4) Leave absorptive cover and polyethylene moisture-retaining cover in place for duration of curing period, but not less than 28 days.
- f. Floors to Receive Curing Compound:
 - 1) Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 2) Recoat areas subjected to heavy rainfall within three hours after initial application.
 - 3) Maintain continuity of coating, and repair damage during curing period.
 - 4) Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
- g. Floors to Receive Curing and Sealing Compound:
 - 1) Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller in accordance with manufacturer's written instructions.

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

3.9 TOLERANCES

- A. Conform to ACI 117.

3.10 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
 1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
 2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
 3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
 - a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
 - 1) Project name.
 - 2) Name of testing agency.
 - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
 - 4) Name of concrete manufacturer.
 - 5) Date and time of inspection, sampling, and field testing.
 - 6) Date and time of concrete placement.
 - 7) Location in Work of concrete represented by samples.
 - 8) Date and time sample was obtained.
 - 9) Truck and batch ticket numbers.
 - 10) Design compressive strength at 28 days.
 - 11) Concrete mixture designation, proportions, and materials.
 - 12) Field test results.
 - 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
 - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- B. Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.

C. Inspections:

1. Headed bolts and studs.
2. Verification of use of required design mixture.
3. Concrete placement, including conveying and depositing.
4. Curing procedures and maintenance of curing temperature.
5. Verification of concrete strength before removal of shores and forms from beams and slabs.
6. Batch Plant Inspections: On a random basis, as determined by Architect.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
2. Slump: ASTM C143/C143M:
 - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - b. Perform additional tests when concrete consistency appears to change.
3. Slump Flow: ASTM C1611/C1611M:
 - a. One test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - b. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C231/C231M pressure method, for normal-weight concrete; .
 - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
5. Concrete Temperature: ASTM C1064/C1064M:
 - a. One test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
6. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.
 - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
7. Compression Test Specimens: ASTM C31/C31M:
 - a. Cast and laboratory cure two sets of two 6-inch by 12-inch or 4-inch by 8-inch cylinder specimens for each composite sample.
 - b. Cast, initial cure, and field cure two sets of two standard cylinder specimens for each composite sample.
8. Compressive-Strength Tests: ASTM C39/C39M.
 - a. Test one set of two laboratory-cured specimens at seven days and one set of two specimens at 28 days.
 - b. Test one set of two field-cured specimens at seven days and one set of two specimens at 28 days.
 - c. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength, and no compressive-strength test value falls below specified compressive strength by more than 500 psi if specified compressive strength is 5000 psi, or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi.
 11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
 12. Additional Tests:
 - a. Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect.
 - b. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
 - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 section 1.6.6.3.
 13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness in accordance with ASTM E1155 within 72 hours of completion of floor finishing and promptly report test results to Architect.

3.11 PROTECTION

- A. Protect concrete surfaces as follows:
1. Protect from petroleum stains.
 2. Diaper hydraulic equipment used over concrete surfaces.
 3. Prohibit vehicles from interior concrete slabs.
 4. Prohibit use of pipe-cutting machinery over concrete surfaces.
 5. Prohibit placement of steel items on concrete surfaces.
 6. Prohibit use of acids or acidic detergents over concrete surfaces.
 7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
 8. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 03 30 00

SECTION 03 30 00.13**SITE CAST-IN-PLACE CONCRETE****PART 1 - GENERAL****1.1 SUMMARY**

Work under this section includes requirements for materials, mixing, forming, placing, finishing, and curing reinforced cast-in-place concrete for all structures, including but not limited to: footings, slabs, grout, concrete blocks, and all other incidental and minor cast-in-place concrete construction. The Contractor shall provide all labor, materials, equipment, and incidental items necessary to provide all cast-in-place concrete indicated on the project drawings and as specified herein.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ACI INTERNATIONAL (ACI)

| | |
|----------------|---|
| ACI 117 | (1990; R 2002) Standard Tolerances for Concrete Construction and Materials & Commentary |
| ACI 211.1 | (1991; R 2002) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete |
| ACI 301 | (1999) Specifications for Structural Concrete for Buildings |
| ACI 302.1R | (2004) Guide for Concrete Floor and Slab Construction |
| ACI 304.2R | (1996) Placing Concrete by Pumping Methods |
| ACI 304R | (2000) Guide for Measuring, Mixing, Transporting, and Placing Concrete |
| ACI 305R | (1999) Hot Weather Concreting |
| ACI 306.1 | (1990; R 2002) Standard Specification for Cold Weather Concreting |
| ACI 318M/318RM | (2002) Metric Building Code Requirements for Structural Concrete and Commentary |
| ACI 347R | (2003) Guide to Formwork for Concrete |
| ACI SP-66 | (2004) ACI Detailing Manual |

**AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
(AASHTO)**

| | |
|--------------|---|
| AASHTO M 182 | (1991; R 2000) Burlap Cloth Made from Jute or Kenaf |
|--------------|---|

AMERICAN HARDBOARD ASSOCIATION (AHA)

| | |
|------------|------------------------|
| AHA A135.4 | (1995) Basic Hardboard |
|------------|------------------------|

ASTM INTERNATIONAL (ASTM)

| | |
|---------------------|---|
| ASTM A 185 | (2002) Steel Welded Wire Reinforcement, Plain, for Concrete |
| ASTM A 496 | (2002) Steel Wire, Deformed, for Concrete Reinforcement |
| ASTM A 497 | (2002) Steel Welded Wire Reinforcement, Deformed, for Concrete |
| ASTM A 615/A 615M | (2004b) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement |
| ASTM A 617/A 617M | (1996a) Axle-Steel Deformed and Plain Bars for Concrete Reinforcement |
| ASTM A 82 | (2002) Steel Wire, Plain, for Concrete Reinforcement |
| ASTM C 1017/C 1017M | (2003) Chemical Admixtures for Use in Producing Flowing Concrete |
| ASTM C 1107 | (2002) Packaged Dry, Hydraulic-Cement Grout (Nonshrink) |
| ASTM C 143/C 143M | (2003) Slump of Hydraulic Cement Concrete |
| ASTM C 150 | (2004a) Portland Cement |
| ASTM C 171 | (2003) Sheet Materials for Curing Concrete |
| ASTM C 172 | (2004) Sampling Freshly Mixed Concrete |
| ASTM C 173/C 173M | (2001e1) Air Content of Freshly Mixed Concrete by the Volumetric Method |
| ASTM C 192/C 192M | (2002) Making and Curing Concrete Test Specimens in the Laboratory |
| ASTM C 227 | (2003) Potential Alkali Reactivity of Cement-Aggregate Combinations (Mortar-Bar Method) |
| ASTM C 231 | (2004) Air Content of Freshly Mixed Concrete by the Pressure Method |
| ASTM C 260 | (2001) Air-Entraining Admixtures for Concrete |
| ASTM C 295 | (2003) Petrographic Examination of Aggregates for Concrete |
| ASTM C 309 | (2003) Liquid Membrane-Forming Compounds for Curing Concrete |
| ASTM C 31/C 31M | (2003a) Making and Curing Concrete Test Specimens in the Field |
| ASTM C 33 | (2003) Concrete Aggregates |
| ASTM C 39 | (1993a) Compressive Strength of Cylindrical Concrete Specimens |
| ASTM C 42/C 42M | (2004) Obtaining and Testing Drilled Cores and Sawed Beams of Concrete |
| ASTM C 494/C 494M | (2004) Chemical Admixtures for Concrete |

| | |
|-----------------|---|
| ASTM C 618 | (2003) Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete |
| ASTM C 881 | (1999) Epoxy-Resin-Base Bonding Systems for Concrete |
| ASTM C 920 | (2002) Elastomeric Joint Sealants |
| ASTM C 94/C 94M | (2004a) Ready-Mixed Concrete |
| ASTM C 989 | (2004) Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars |
| ASTM D 1190 | (1997) Concrete Joint Sealer, Hot-Applied Elastic Type U.S. DEPARTMENT OF COMMERCE (DOC) |
| PS1 | (1995) Construction and Industrial Plywood (APA V995) |

1.3 DEFINITIONS

A. "Cementitious material" as used herein shall include all portland cement, pozzolan, fly ash, and ground iron blast-furnace slag.

B. "Exposed to public view" means situated so that it can be seen from eye level from a public location after completion of the building. A public location is accessible to persons not responsible for operation or maintenance of the building.

1.4 SUBMITTALS

The following shall be submitted in accordance with Section 01300, "Submittals."

A. Shop Drawings

1. Reinforcing steel

Reproductions of contract drawings are unacceptable. ACI SP-66. Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars.

B. Product Data

1. Materials for curing concrete

C. Design Data

1. Concrete mix design

Submit copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified and that mix will be suitable for the job conditions. The laboratory test reports shall include mill test and all other test for cement, aggregates, and admixtures. Provide maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Test

reports shall be submitted along with the concrete mix design. Obtain approval before concrete placement.

Thirty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, pozzolans, ground slag, and admixtures; and applicable reference specifications. Provide mix proportion data using at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required. If source material changes, resubmit mix proportion data using revised source material. No material shall be provided unless proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Owner's Representative. The submittal shall clearly indicate where each mix design will be used when more than one mix design is submitted. Submit additional data regarding concrete aggregates if the source of aggregate changes. In addition, copies of the fly ash, and pozzolan test results shall be submitted. The approval of fly ash, and pozzolan test results shall have been within 6 months of submittal date. Obtain acknowledgement of receipt prior to concrete placement.

D. Test Reports

1. Concrete mix design

2. Aggregates

ASTM C 227 for potential alkali-silica reactions, ASTM C 295 for petrographic analysis.

3. Compressive strength tests

E. Certificates

1. Testing

Qualifications of the independent testing laboratory for approval.

1.5 MODIFICATION OF REFERENCES

Accomplish work in accordance with ACI publications except as modified herein. Consider the advisory or recommended provisions to be mandatory, as though the word "shall" had been substituted for the words "should" or "could" or "may," wherever they appear. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Owner.

1.6 DELIVERY, STORAGE, AND HANDLING

Do not deliver concrete until vapor barrier, forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement. ACI 301 for job site storage of materials. Protect materials from contaminants such as grease, oil, and dirt. Ensure materials can be accurately identified after bundles are broken and tags removed.

1.6.1 Reinforcement

Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground. Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed.

PART 2 - PRODUCTS

2.1 MATERIALS FOR FORMS

Provide wood, plywood, or steel. Use plywood or steel forms where a smooth form finish is required. Lumber shall be square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Plywood: PS1, B-B concrete form panels or better or AHA A135.4, hardboard for smooth form lining. Steel form surfaces shall not contain irregularities, dents, or sags.

2.2 FORM TIES AND ACCESSORIES

The use of wire alone is prohibited. Form ties and accessories shall not reduce the effective cover of the reinforcement.

2.3 CONCRETE

2.3.1 Contractor-Furnished Mix Design

ACI 211.1, ACI 301, and ACI 318M/318RM except as otherwise specified. The compressive strength (f'c) of the concrete for each portion of the structure(s) shall be as indicated and as specified below.

| Location | f'c (Min. 28- Day Comp. Strength) (psi) | ASTM C 33 Maximum Nominal Aggregate (Size No.) | Range of Slump (inches) | Maximum Water- Cement Ratio (by weight) | Air Entr. (percent) |
|-----------|---|--|----------------------------------|---|---------------------------|
| All areas | 5000 | 57 | 4" | 0.42 | 6%-8% |

Maximum slump shown above may be increased 1 inch for methods of consolidation other than vibration. Slump may be increased to 8 inches when super plasticizers are used.

Provide concrete to the following criteria:

Flexible Strength: 700 psi.

Compressive Strength: 4,000 psi @ 28 days for concrete pavement; 3,500 psi @ 28 days for curb and gutter and sidewalks.

Slump: 4 to 5 inches.

Use accelerating admixtures in cold weather only when acceptable to Engineer. Use of admixtures will not relax cold weather placement requirements.

Use calcium chloride only when accepted by Engineer.

Use set retarding admixtures during hot weather only when accepted by Engineer.

2.3.1.1 Mix Proportions for Normal Weight Concrete

Trial design batches, mixture proportioning studies, and testing requirements for various classes and types of concrete specified shall be the responsibility of the Contractor. Mixture proportions shall be based on compressive strength as determined by test specimens fabricated in accordance with ASTM C 192/C 192M and tested in accordance with ASTM C 39. Samples of all materials used in mixture proportioning studies shall be representative of those proposed for use in the project and shall be accompanied by the manufacturer's or producer's test report indicating compliance with these specifications. Trial mixtures having proportions, consistencies, and air content suitable for the work shall be made based on methodology described in ACI 211.1. The trial mixture shall use at least three different water-cement ratios for each type of mixture, which will produce a range of strength encompassing those required for each class and type of concrete required on the project. The maximum water-cement ratio required will be based on equivalent water-cement ratio calculations as determined by the conversion from the weight ratio of water to cement plus pozzolan, and ground granulated blast-furnace slag by weight equivalency method. Laboratory trial mixture shall be designed for maximum permitted slump and air content. Each combination of material proposed for use shall have separate trial mixture, except for accelerator or retarder use can be provided without separate trial mixture. The temperature of concrete in each trial batch shall be reported. For each water-cement ratio, at least three test cylinders for each test age shall be made and cured in accordance with ASTM C 192/C 192M and tested in accordance with ASTM C 39 for 7 and 28 days. From these results, a curve shall be plotted showing the relationship between water-cement ratio and strength for each set of trial mix studies. In addition a curve shall be plotted showing the relationship between 7 and 28 day strengths.

2.3.1.2 Required Average Strength of Mix Design

The selected mixture shall produce an average compressive strength exceeding the specified strength by the amount indicated in ACI 301. When a concrete production facility has a record of at least 15 consecutive tests, the standard deviation shall be calculated and the required average compressive strength shall be determined in accordance with ACI 301. When a concrete production facility does not have a suitable record of tests to establish a standard deviation, the required average strength shall be as follows:

- A. For $f'c$ between 3000 and 5000 psi, 1200 psi plus $f'c$.

2.4 MATERIALS

2.4.1 Cement

ASTM C 150, Type II.

2.4.1.1 Fly Ash and Pozzolan

ASTM C 618, Type N, F, or C, except that the maximum allowable loss on ignition shall be 6 percent for Types N and F. Add with cement.

2.4.1.2 Ground Iron Blast-Furnace Slag

ASTM C 989, Grade 120.

2.4.2 Water

Water shall be fresh, clean, and potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete.

2.4.3 Aggregates

ASTM C 33, except as modified herein. Furnish aggregates for exposed concrete surfaces from one source. Aggregates shall not contain any substance which may be deleteriously reactive with the alkalis in the cement.

2.4.4 Nonshrink Grout

ASTM C 1107.

2.4.5 Admixtures

ASTM C 494/C 494M: Type A, water reducing; Type B, retarding; Type C, accelerating; Type D, water-reducing and retarding; and Type E, water-reducing and accelerating admixture. Do not use calcium chloride admixtures.

2.4.5.1 Air-Entraining

ASTM C 260.

2.4.5.2 High Range Water Reducer (HRWR) (Super plasticizers)

ASTM C 494/C 494M, Type F and ASTM C 1017/C 1017M.

2.4.6 Materials for Curing Concrete

2.4.6.1 Impervious Sheeting

ASTM C 171; waterproof paper, clear or white polyethylene sheeting, or polyethylene-coated burlap.

2.4.6.2 Pervious Sheeting

AASHTO M 182.

2.4.6.3 Liquid Membrane-Forming Compound

ASTM C 309, white-pigmented, Type 2, Class B.

2.4.7 Liquid Chemical Sealer-Hardener Compound

Compound shall be magnesium fluosilicate which when mixed with water seals and hardens the surface of the concrete. Do not use on exterior slabs exposed to freezing conditions. Compound shall not reduce the adhesion of resilient flooring, tile, paint, roofing, waterproofing, or other material applied to concrete.

2.4.8 Joint Sealants

2.4.8.1 Horizontal Surfaces, 3 Percent Slope, Maximum

ASTM D 1190 or ASTM C 920, Type M, Class 25, Use T.

2.4.8.2 Vertical Surfaces Greater Than 3 Percent Slope

ASTM C 920, Type M, Grade NS, Class 25, Use T.

2.4.9 Epoxy Bonding Compound

ASTM C 881. Provide Type I for bonding hardened concrete to hardened concrete; Type II for bonding freshly mixed concrete to hardened concrete; and Type III as a binder in epoxy mortar or concrete, or for use in bonding skid-resistant materials to hardened concrete. Provide Grade 1 or 2 for horizontal surfaces and Grade 3 for vertical surfaces. Provide Class A if placement temperature is below 40 degrees F; Class B if placement temperature is between 40 and 60 degrees F; or Class C if placement temperature is above 60 degrees F.

2.5 REINFORCEMENT

2.5.1 Reinforcing Bars

ACI 301 unless otherwise specified. ASTM A 615/A 615M and ASTM A 617/A 617M with the bars marked A, S, W, Grade

2.5.2 Mechanical Reinforcing Bar Connectors

ACI 301. Provide 125 percent minimum yield strength of the reinforcement bar.

2.5.3 Welded Wire Fabric

ASTM A 185 or ASTM A 497. Provide flat sheets of welded wire fabric for slabs and toppings.

2.5.4 Wire

ASTM A 82 or ASTM A 496.

2.5.5 Reinforcing Bar Supports

Provide bar ties and supports of coated or non corrodible material.

PART 3 - EXECUTION

3.1 FORMS

ACI 301. Provide forms, shoring, and scaffolding for concrete placement. Set forms mortar-tight and true to line and grade. Chamfer above grade exposed joints, edges, and external corners of concrete 0.75 inch unless otherwise indicated. Provide formwork with clean-out openings to permit inspection and removal of debris. Forms submerged in water shall be watertight.

3.1.1 Coating

Before concrete placement, coat the contact surfaces of forms with a nonstaining mineral oil, nonstaining form coating compound, or two coats of nitrocellulose lacquer. Do not use mineral oil on forms for surfaces to which adhesive, paint, or other finish material is to be applied.

3.1.2 Removal of Forms and Supports

After placing concrete, forms shall remain in place for the time periods specified in ACI 347R. Prevent concrete damage during form removal.

3.1.2.1 Special Requirements for Reduced Time Period

Forms may be removed earlier than specified if ASTM C 39 test results of field-cured samples from a representative portion of the structure indicate that the concrete has reached a minimum of 85 percent of the design strength.

3.1.3 Reshoring

Reshore concrete elements where forms are removed prior to the specified time period. Do not permit elements to deflect or accept loads during form stripping or reshoring. Forms on columns, walls, or other load-bearing members may be stripped after 2 days if loads are not applied to the members. After forms are removed, slabs and beams over 10 feet in span and cantilevers over 4 feet shall be reshored for the remainder of the specified time period in accordance with paragraph entitled "Removal of Forms." Perform reshoring operations to prevent subjecting concrete members to overloads, eccentric loading, or reverse bending. Reshoring elements shall have the same load-carrying capabilities as original shoring and shall be spaced similar to original shoring. Firmly secure and brace reshoring elements to provide solid bearing and support.

3.2 Waterstop Splices

Fusion weld in the field.

3.3 Formed Surfaces

3.3.1 Tolerances

ACI 347R and as indicated.

3.3.2 As-Cast Form

Provide form facing material producing a smooth, hard, uniform texture on the concrete. Arrange facing material in an orderly and symmetrical manner and keep seams to a practical minimum. Support forms as necessary to meet required tolerances. Material with raised grain, torn surfaces, worn edges, patches, dents, or other defects which will impair the texture of the concrete surface shall not be used.

3.4 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

ACI 301. Provide bars, wire fabric, wire ties, supports, and other devices necessary to install and secure reinforcement. Reinforcement shall not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.

3.4.1 Reinforcement Supports

Place reinforcement and secure with galvanized or non corrodible chairs, spacers, or metal hangers. For supporting reinforcement on the ground, use concrete or other non corrodible material, having a compressive strength equal to or greater than the concrete being placed.

3.4.2 Splicing

As indicated. For splices not indicated ACI 301. Do not splice at points of maximum stress.

3.4.3 Future Bonding

Plug exposed, threaded, mechanical reinforcement bar connectors with a greased bolt. Bolt threads shall match the connector. Countersink the connector in the concrete. Calk the depression after the bolt is installed.

3.4.4 Cover

ACI 301 for minimum coverage, unless otherwise indicated.

3.4.5 Setting Miscellaneous Material

Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

3.4.6 Construction Joints

Locate joints to least impair strength. Continue reinforcement across joints unless otherwise indicated.

3.4.7 Expansion Joints and Contraction Joints

Provide expansion joint at edges of interior floor slabs on grade abutting vertical surfaces, and as indicated. Make expansion joints 1/2 inch wide unless indicated otherwise. Fill expansion joints not exposed to weather with preformed joint filler material. Completely fill joints exposed to weather with joint filler material and joint sealant. Do not extend reinforcement or other embedded metal items bonded to the concrete through any expansion joint unless an expansion sleeve is used. Provide contraction joints, either formed or saw cut or cut with a jointing tool, to the indicated depth after the surface has been finished. Sawed joints shall be completed within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

3.5 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

ASTM C 94/C 94M, ACI 301, ACI 302.1R, and ACI 304R, except as modified herein. Batching equipment shall be such that the concrete ingredients are consistently measured within the following tolerances: 1 percent for cement and water, 2 percent for aggregate, and 3 percent for admixtures. Furnish mandatory batch ticket information for each load of ready mix concrete.

3.5.1 Measuring

Make measurements at intervals as specified in paragraphs entitled "Sampling" and "Testing."

3.5.2 Mixing

ASTM C 94/C 94M and ACI 301. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Reduce mixing time and place concrete within 60 minutes if the air temperature is greater than 85 degrees F except as follows: if set retarding admixture is used and slump requirements can be met, limit for placing concrete may remain at 90 minutes. Additional water may be added, provided that both the specified maximum slump and water-cement ratio are not exceeded. When additional water is added, an additional 30 revolutions of the mixer at mixing speed is required. If the entrained air content falls below the specified limit, add a sufficient quantity of admixture to bring the entrained air content within the specified limits. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch.

3.5.3 Transporting

Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete which has segregated in transporting and dispose of as directed.

3.6 PLACING CONCRETE

Place concrete as soon as practicable after the forms and the reinforcement have been inspected and approved. Do not place concrete when weather conditions prevent proper placement and consolidation; in uncovered areas during periods of precipitation; or in standing water. Prior to placing concrete, remove dirt, construction debris, water, snow, and ice from within the forms. Deposit concrete as close as practicable to the final position in the forms. Do not exceed a free vertical drop of 3 feet from the point of discharge. Place concrete in one continuous operation from one end of the structure towards the other. Position grade stakes on 10 foot centers maximum in each direction when pouring interior slabs and on 20 foot centers maximum for exterior slabs.

3.6.1 Footing Placement

Concrete for footings may be placed in excavations without forms upon inspection and approval by the Owner's Representative. Excavation width shall be a minimum of 4 inches greater than indicated.

3.6.2 Vibration

ACI 301 Furnish a spare, working, vibrator on the job site whenever concrete is placed. Consolidate concrete slabs greater than 4 inches in depth with high frequency mechanical vibrating equipment supplemented by hand spading and tamping. Consolidate concrete slabs 4 inches or less in depth by wood tampers, spading, and settling with a heavy leveling straightedge. Operate internal vibrators with vibratory element submerged in the concrete, with a minimum frequency of not less than 6000 impulses per minute when submerged. Do not use vibrators to transport the concrete in the forms. Insert and withdraw vibrators approximately 18 inches apart. Penetrate the previously placed lift with the vibrator when more than one lift is required. Place concrete in 18 inch maximum vertical lifts. External vibrators shall be used on the exterior surface of the forms when internal vibrators do not provide adequate consolidation of the concrete.

3.6.3 Application of Epoxy Bonding Compound

Apply a thin coat of compound to dry, clean surfaces. Scrub compound into the surface with a stiff-bristle brush. Place concrete while compound is stringy. Do not permit compound to harden prior to concrete placement. Follow manufacturer's instructions regarding safety and health precautions when working with epoxy resins.

3.6.4 Pumping

ACI 304R and ACI 304.2R. Pumping shall not result in separation or loss of materials nor cause interruptions sufficient to permit loss of plasticity between successive increments. Loss of slump in pumping equipment shall not exceed 2 inches. Concrete shall not be conveyed through pipe made of aluminum or aluminum alloy. Rapid changes in pipe sizes shall be avoided. Maximum size of course aggregate shall be limited to 33 percent of the diameter of the pipe. Maximum size

of well rounded aggregate shall be limited to 40 percent of the pipe diameter. Samples for testing shall be taken at both the point of delivery to the pump and at the discharge end.

3.6.5 Cold Weather

ACI 306.1. Do not allow concrete temperature to decrease below 50 degrees F Obtain approval prior to placing concrete when the ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain 50 degrees F minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to 5 degrees F in any 1 hour and 50 degrees F per 24 hours after heat application.

3.6.6 Hot Weather

ACI 305R. Maintain required concrete temperature using Figure 2.1.5 in ACI 305R to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

3.7 SURFACE FINISHES EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES

3.7.1 Defects

Repair formed surfaces by removing minor honeycombs, pits greater than 1 square inch surface area or 0.25 inch maximum depth, or otherwise defective areas. Provide edges perpendicular to the surface and patch with nonshrink grout. Patch tie holes and defects when the forms are removed. Concrete with extensive honeycomb including exposed steel reinforcement, cold joints, entrapped debris, separated aggregate, or other defects which affect the serviceability or structural strength will be rejected, unless correction of defects is approved. Obtain approval of corrective action prior to repair. The surface of the concrete shall not vary more than the allowable tolerances of ACI 347R. Exposed surfaces shall be uniform in appearance and finished to a smooth form finish unless otherwise specified.

3.7.2 Not Against Forms (Top of Walls)

Surfaces not otherwise specified shall be finished with wood floats to even surfaces. Finish shall match adjacent finishes.

3.7.3 Formed Surfaces

3.7.3.1 Tolerances

ACI 117 and as indicated.

3.7.3.2 As-Cast Rough Form

Provide for surfaces not exposed to public view. Patch holes and defects and level abrupt irregularities. Remove or rub off fins and other projections exceeding 0.25 inch in height.

3.8 FLOOR AND SLAB FINISHES AND MISCELLANEOUS CONSTRUCTION

ACI 302.1R, unless otherwise specified. Slope floors uniformly to drains where drains are provided. Where straightedge measurements are specified, Contractor shall provide straightedge.

3.8.1 Finish

Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater.

3.8.1.1 Floated

Use for exterior slabs where not otherwise specified. After the concrete has been placed, consolidated, struck off, and leveled, do not work the concrete further, until ready for floating. Whether floating with a wood, magnesium, or composite hand float, with a bladed power trowel equipped with float shoes, or with a powered disc, float shall begin when the surface has stiffened sufficiently to permit the operation. During or after the first floating, surface shall be checked with a 10 foot straightedge applied at no less than two different angles, one of which is perpendicular to the direction of strike off. High spots shall be cut down and low spots filled during this procedure to produce a surface level within 1/4 inch in 10 feet.

3.8.2 Pits and Trenches

Place bottoms and walls monolithically or provide waterstops and keys.

3.9 CURING AND PROTECTION

ACI 301 unless otherwise specified. Begin curing immediately following form removal. Avoid damage to concrete from vibration created by blasting, pile driving, movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, and any other activity resulting in ground vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period. Provide moist curing for those areas receiving liquid chemical sealer-hardener or epoxy coating.

3.9.1 Moist Curing

Remove water without erosion or damage to the structure.

3.9.1.1 Ponding or Immersion

Continually immerse the concrete throughout the curing period. Water shall not be more than 20 degrees F less than the temperature of the concrete. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

3.9.1.2 Fog Spraying or Sprinkling

Apply water uniformly and continuously throughout the curing period. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

3.9.1.3 Pervious Sheeting

Completely cover surface and edges of the concrete with two thicknesses of wet sheeting. Overlap sheeting 6 inches over adjacent sheeting. Sheeting shall be at least as long as the width of the surface to be cured. During application, do not drag the sheeting over the finished concrete nor over sheeting already placed. Wet sheeting thoroughly and keep continuously wet throughout the curing period.

3.9.1.4 Impervious Sheeting

Wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 12 inches minimum. Provide sheeting not less than 18 inches wider than the concrete surface to be cured. Secure edges and transverse laps to form closed joints. Repair torn or damaged sheeting or provide new sheeting. Cover or wrap columns, walls, and other vertical structural elements from the top down with impervious sheeting; overlap and continuously tape sheeting joints; and introduce sufficient water to soak the entire surface prior to completely enclosing.

3.9.2 Liquid Membrane-Forming Curing Compound

Seal or cover joint openings prior to application of curing compound. Prevent curing compound from entering the joint. Apply in accordance with the recommendations of the manufacturer immediately after any water sheen which may develop after finishing has disappeared from the concrete surface. Provide and maintain compound on the concrete surface throughout the curing period. Do not use this method of curing where the use of Figure 2.1.5 in ACI 305R indicates that hot weather conditions will cause an evaporation rate exceeding 0.2 pound of water per square foot per hour.

3.9.2.1 Application

Unless the manufacturer recommends otherwise, apply compound immediately after the surface loses its water sheen and has a dull appearance, and before joints are sawed. Mechanically agitate curing compound thoroughly during use. Use approved power-spraying equipment to uniformly apply two coats of compound in a continuous operation. The total coverage for the two coats shall be 200 square feet maximum per gallon of undiluted compound unless otherwise recommended by the manufacturer's written instructions. The compound shall form a uniform, continuous, coherent film that will not check, crack, or peel. Immediately apply an additional coat of compound to areas where the film is defective. Re-spray concrete surfaces subjected to rainfall within 3 hours after the curing compound application.

3.9.2.2 Protection of Treated Surfaces

Prohibit pedestrian and vehicular traffic and other sources of abrasion at least 72 hours after compound application. Maintain continuity of the coating for the entire curing period and immediately repair any damage.

3.9.3 Liquid Chemical Sealer-Hardener

Apply sealer-hardener to interior floors not receiving floor covering and floors located under access flooring. Apply the sealer-hardener in accordance with manufacturer's recommendations.

Seal or cover joints and openings in which joint sealant is to be applied as required by the joint sealant manufacturer. The sealer-hardener shall not be applied until the concrete has been moist cured and has aged for a minimum of 30 days. Apply a minimum of two coats of sealer-hardener.

3.9.4 Curing Periods

ACI 301 except 10 days for retaining walls, pavement or chimneys, 21 days for concrete that will be in full-time or intermittent contact with seawater, salt spray, alkali soil or waters. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing shall be subject to approval by the Owner's Representative.

3.10 FIELD QUALITY CONTROL

3.10.1 Sampling

ASTM C 172. Collect samples of fresh concrete to perform tests specified. ASTM C 31/C 31M for making test specimens.

3.10.2 Testing

Testing shall be performed by an approved independent testing laboratory subject to approval.

3.10.2.1 Slump Tests

ASTM C 143/C 143M. Take concrete samples during concrete placement. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cement ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 20 cubic yards (maximum) of concrete.

3.10.2.2 Temperature Tests

Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

3.10.2.3 Compressive Strength Tests

ASTM C 39. Make five test cylinders for each set of tests in accordance with ASTM C 31/C 31M. Precautions shall be taken to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold one cylinder in reserve. Samples for strength tests of each mix design of concrete placed each day shall be taken not less than once a day, nor less than once for each 100 cubic yards of concrete, nor less than once for each 5000 square feet of surface area for slabs or walls. For the entire project, take no less than five sets of samples and perform strength tests for each mix design of concrete placed. Each strength test result shall be the average of two cylinders from the same concrete sample tested at 28 days. If the average of any three consecutive strength test results is less than f'c or if any strength test result falls below f'c by more than 500 psi, take a minimum of three ASTM C 42/C 42M core samples from the in-place work represented by the low test cylinder results and test. Concrete represented by core test shall be considered structurally adequate if the average of three cores is equal to at least 85 percent of f'c and if no single core is less than 75 percent of f'c. Locations represented by erratic core strengths shall be retested. Remove concrete not meeting strength

criteria and provide new acceptable concrete. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

3.10.2.4 Air Content

ASTM C 173/C 173M or ASTM C 231 for normal weight concrete. Test air-entrained concrete for air content at the same frequency as specified for slump tests.

3.10.2.5 Quality Assurance

Perform work in accordance with ACI 301, ACI 318, and ACI 330R.

Obtain cementitious materials from same source throughout.

Conform to ACI 117 – Specifications for Tolerances for Concrete Construction and Materials.

Method of measurement for accessible route with a 24" digital smart-level will be used to measure points along the accessible route. Line of measurement shall be parallel to the long edge of ramp or accessible route, whether straight or curved. Longitudinal measurement lines shall be spaced 3 feet apart, but in no case shall fewer than two lines be used. The horizontal measurement cross-slope will be measured every 6 feet. Engineer reserves the right to gather additional measurements if further investigation is necessary. The 24" Smart-level slope readings greater than specified tolerance within contract documents will be identified as non-compliant and not accepted.

Engineer reserves the right to mark and reject portions of concrete not within tolerance as specified.

3.11 GUARANTEE

Contractor shall guarantee the quality of materials and workmanship for a period of 12 months after acceptance. Defects discovered during this period shall be repaired by Contractor at no cost to the Owner.

3.12 FINISHING

After striking off and consolidating concrete, smooth surface by screeding and floating. Adjust floating to compact surface and produce uniform texture. After floating, test surface for trueness with ten foot (10') straight edge. Distribute concrete as required to remove surface irregularities and refloat repaired areas to provide continuous smooth finish.

Work edges of slab and formed joints with edging tool, rounding edges to 1/2 inch radius. Estimate tool marks on concrete surface. After completion of floating and troweling, when excess moisture or surface sheen has disappeared, complete surface finishing as follows:

1. Paving: Provide course, non-slip finish by scoring surface with a stiff-bristled broom perpendicular to flow of traffic so as to produce regular corrugations not over 1/16 of an inch deep.
2. Sidewalk Paving: Light broom, radius to ½ inch radius, and trowel joint edges.
3. Curb and Gutters: Light Broom parallel.

4. Direction of Texturing: Transverse to pavement direction.

Do not remove forms for twenty-four (24) hours after concrete has been placed. After form removal, clean ends of joints and paint-up minor honeycombed areas. Remove and replace areas or sections with major defects, as directed by Owner.

Protect and cure finished concrete paving using either membrane curing compound or moist-curing methods described in "water-curing section of ACI 308."

Inclined Vehicular Ramps: Broomed perpendicular to slope.

Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

3.13 CURB AND GUTTER SECTIONS

Shall be constructed as shown on the drawings and in accordance with applicable details. Subgrade below the curb and gutter sections shall be compacted to 98% density. Curb and gutter sections shall be constructed in sections of uniform length and shall not exceed 10 feet or be less than 5 feet in length. Straight edging along the edge of gutter and top of curb shall conform to those requirements for adjacent pavement but with no irregularities to exceed 1/4 inch in 10 feet.

If slip-form or extruded construction is used, contraction joints shall be located at intervals no greater than 10 feet by sawing hardened concrete at the proper time. Joints shall be sawed between 4 to 8 hours after placing of concrete. Depth of saw-cut shall be one-fourth thickness of the curb and gutter section. The maximum width of cut shall be 1/4 inch. All joints shall be sawed in succession.

Half inch thick premolded expansion joints shall be installed completely through the joints at spaces not to exceed 50 feet and at all structures and walks.

When curb forms are removed, backfill shall be immediately placed, tamped, and graded behind the new curb to help protect line and grade. Machine methods of placing and forming may be used provided finished product is satisfactory to the Engineer.

Contractor shall place a concrete depressed curb at all driveways shown on the drawings or where a driveway is in use.

Cracked curb and gutter will not be accepted.

End of Section 03 30 00.13

SECTION 03 35 43 - POLISHED CONCRETE FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Polished concrete finishing, including staining.
- 2. Concrete for polished concrete, including concrete materials, mixture design, placement procedures, initial finishing, and curing is specified in Section 03 30 00 "Cast-in-Place Concrete."

B. Related Requirements:

- 1. Section 03 30 00 "Cast-in-Place Concrete" for concrete not designated as polished concrete.

1.3 DEFINITIONS

- A. Design Reference Sample: Sample designated by Design Professional in the Contract Documents that reflects acceptable surface quality and appearance of polished concrete.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

- 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with polished concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Cast-in-place concrete subcontractor.
 - e. Polished concrete finishing Subcontractor.
- 2. Review cold- and hot-weather concreting procedures, curing procedures, construction joints, concrete repair procedures, concrete finishing, and protection of polished concrete.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Polishing Schedule: Submit plan showing polished concrete surfaces and schedule of polishing operations for each area of polished concrete before start of polishing operations. Include locations of all joints, including construction joints.
- C. Samples for Initial Selection: For each type of product requiring color selection.
- D. Samples for Verification: For each type of exposed color.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Repair materials.
 - 2. Stain materials.
 - 3. Liquid floor treatments.

1.7 QUALITY ASSURANCE

- A. Field Sample Panels: After approval of verification sample and before casting concrete, produce field sample panels to demonstrate the approved range of selections made under Sample submittals. Produce a minimum of three sets of full-scale panels, approximately 48 by 48 inches minimum, to demonstrate the expected range of finish, color, and appearance variations.
 - 1. Locate panels as indicated or, if not indicated, as directed by Architect.
 - 2. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
 - 3. Demolish and remove field sample panels when directed.

1.8 FIELD CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.

PART 2 - PRODUCTS

2.1 STAIN MATERIALS

- A. Penetrating Stain: Water-based, acrylic latex, penetrating stain with colorfast pigments.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CretoSeal
 - b. Euclid Chemical Company
 - c. Sherwin-Williams Company
 - d. SureCrete Design Products

PART 3 - EXECUTION

3.1 POLISHING

- A. Polish: Level 4: Gloss shine, 3000 grit.
- B. Apply polished concrete finish system to cured and prepared slabs to match accepted mockup.
 1. Machine grind floor surfaces to receive polished finishes level and smooth.
 2. Apply penetrating liquid floor treatment for polished concrete in polishing sequence and according to manufacturer's written instructions, allowing recommended drying time between successive coats.
 3. Apply penetrating stain for polished concrete in polishing sequence and according to manufacturer's written instructions.
 4. Continue polishing with progressively finer-grit diamond polishing pads to gloss level, to match approved mockup.
 5. Control and dispose of waste products produced by grinding and polishing operations.
 6. Neutralize and clean polished floor surfaces.

3.2 STAINING

- A. Newly placed concrete shall be at least 30 days old before staining.
- B. Prepare surfaces according to manufacturer's written instructions and as follows:
 1. Clean concrete thoroughly by scraping, applying solvents or stripping agents, sweeping and pressure washing, or scrubbing with a rotary floor machine and detergents recommended by stain manufacturer. Rinse until water is clear and allow surface to dry.
 2. Test surfaces with droplets of water. If water beads and does not penetrate surface, or penetrates only in some areas, profile surfaces by grinding, sanding, or abrasive blasting. Retest and continue profiling surface until water droplets immediately darken and uniformly penetrate concrete surfaces.
 3. Neutralize concrete surfaces and rinse until water is clear. Test surface for residue with clean white cloth. Test surface according to ASTM F710 to ensure pH is between 7 and 8.
- C. Allow concrete surface to dry before applying stain. Verify readiness of concrete to receive stain according to ASTM D4263 by tightly taping 18-by-18-inch, 4-mil- thick polyethylene

sheet to a representative area of concrete surface. Apply stain only if no evidence of moisture has accumulated under sheet after 16 hours.

- D. Penetrating Stain: Apply penetrating stain to concrete surfaces according to manufacturer's written instructions and as follows:
1. Apply first coat of stain to dry, clean surfaces by airless sprayer or by high-volume, low-pressure sprayer.
 2. Allow to dry four hours and repeat application of stain in sufficient quantity to obtain color consistent with approved mockup.
 3. Rinse until water is clear. Control, collect, and legally dispose of runoff.

END OF SECTION 03 35 43

SECTION 03 41 00**PRECAST STRUCTURAL CONCRETE****PART 1 - GENERAL****1.1 SUMMARY**

Work under this section includes requirements for materials, mixing, forming, placing, finishing, and curing precast concrete for all structures, including but not limited to: drainage structures, drop inlets, utility vaults, etc. The Contractor shall provide all labor, materials, equipment, and incidental items necessary to provide all precast concrete indicated on the project drawings and as specified herein.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ACI INTERNATIONAL (ACI)

ACI 304R(2000) Measuring, Mixing, Transporting, and Placing Concrete

ACI 309R(1996) Consolidation of Concrete

ACI 318/318R(2002) Building Code Requirements for Structural Concrete

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 27/A 27M(2003) Steel Castings, Carbon, for General Application

ASTM A 47/ A 47M(1999) Ferritic Malleable Iron Castings

ASTM A 82(1997) Steel Wire, Plain, for Concrete Reinforcement

ASTM A 123/A 123M(2002) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

ASTM A 153/A 153M(2003) Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A 496(2002) Steel Wire, Deformed, for Concrete Reinforcement

ASTM A 615/A 615M(2004) Deformed and Plain Billet-Steel Bars for Concrete Reinforcement

ASTM A 780(2001) Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings

ASTM C 33(2003) Concrete Aggregates

ASTM C 94/ C 94M(2003; Rev. A) Ready-Mixed Concrete

ASTM C 150(2002; E2003 Rev. A) Portland Cement

| | |
|--------------------------------|---|
| ASTM C 260(2001) | Air-Entraining Admixtures for Concrete |
| ASTM C 494(1999; E2001 Rev. A) | Chemical Admixtures for Concrete |
| ASTM C 1107(2002) | Packaged Dry, Hydraulic-Cement Grout (Nonshrink) |
| ASTM C 1260(2001) | Potential Alkali Reactivity of Aggregates (Mortar-Bar Method) |

AMERICAN WELDING SOCIETY (AWS)

| | |
|----------------|---|
| AWS D1.4(1998) | Structural Welding Code - Reinforcing Steel |
|----------------|---|

PRECAST/PRESTRESSED CONCRETE INSTITUTE (PCI)

| | |
|-------------------|--|
| PCI MNL-116(1999) | Quality Control for Plants and Production of Precast Prestressed Concrete Products |
| PCI MNL-120(1999) | Design Handbook - Precast and Prestressed Concrete |

1.3 SYSTEM DESCRIPTION

The work includes the provision of precast non-prestressed concrete herein referred to as precast structures. Precast structures shall be the product of a manufacturer specializing in the production of precast concrete structures.

1.4 SUBMITTALS

The following shall be submitted in accordance with Section 01300, "Submittals."

A. Shop Drawings

1. Drawings of precast structures

B. Design Data

1. Concrete mix design

C. Test Reports

1. Concrete mix design

Submit copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified and that mix will be suitable for the job conditions. The laboratory test reports shall include mill test and all other test for cement, aggregates, and admixtures. Provide maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained versus sieve size. Test reports shall be submitted along with the concrete mix design. Obtain approval before concrete placement.

2. Aggregates

Submit test results for aggregates in accordance with ASTM C 1260 for potential alkali-silica reactions.

- 3. Compressive Strength tests
- D. Certificates
 - 1. Quality control procedures
 - Submit quality control procedures established in accordance with PCI MNL-116 by the precast manufacturer.
- 1.5 QUALITY ASSURANCE
 - 1.5.1 Qualifications
 - 1.5.1.1 Manufacturer Qualifications
 - PCI MNL-116. Plants shall be certified by the PCI Plant Certification Program. At the Owner's option, PCI Plant quality control program records shall be available for review.
 - 1.5.2 Regulatory Requirements
 - Provide precast structures in conformance with ACI 318/318R and AWS D1.4.
 - 1.5.3 Concrete Mix Design
 - Thirty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, pozzolans, ground slag, and admixtures, and applicable reference specification. Provide mix proportion data using at least three different water-cement ratios for each class and type of concrete required. If source material changes, resubmit mix proportion data using revised source material. No material shall be provided unless proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Owner. The submittal shall clearly indicate where each mix design will be used when more than one mix design is submitted. Submit additional data regarding concrete aggregates if the source of aggregates changes.
 - 1.6 DELIVERY, STORAGE, AND HANDLING
 - 1.6.1 Transportation
 - 1.6.1.1 Transporting Structures
 - In transporting structures by truck, railroad car, or barge, provision shall be made for supporting the structures as described above, except battens can be continuous over more than one stack of units, with adequate bracing to ensure their maintaining the vertical position and damping of dangerous vibrations. Trucks with double bolsters are satisfactory provided the structures are fully seated on the outer bolsters at not more than 3 feet or the depth of the member from the end and the inner bolster is not more than 8 feet from the end of the member or the designated pickup point. Adequate padding material shall be provided between tie chains or cables to preclude chipping of concrete.
 - 1.6.2 Storage
 - 1.6.2.1 Storage Areas

Storage areas for precast structures shall be stabilized, and suitable foundations shall be provided, so differential settlement or twisting of structures will not occur.

1.6.3 Handling of Structures

The location of pickup points for handling of the structures and details of the pickup devices shall be shown in shop drawings. Structures shall be handled only by means of approved devices at designated locations. Structures shall be maintained in an upright position at all times and picked up and supported as shown in approved shop drawings.

PART 2 - PRODUCTS

2.1 CONTRACTOR-FURNISHED MIX DESIGN

ACI 318/318R. The minimum compressive strength of concrete at 28 days shall be 5000 psi. The maximum water cement ratio shall be 0.40.

2.2 MATERIALS

2.2.1 Cement

ASTM C 150, Type II.

2.2.2 Water

Water shall be fresh, clean, and potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete, ACI 318/318R.

2.2.3 Aggregates

2.2.3.1 Aggregates Selection

ASTM C 33, Size 57. Obtain aggregates for exposed concrete surfaces from one source. Aggregates shall not contain any substance which may be deleteriously reactive with the alkalis in the cement, nor in an amount sufficient to cause excessive expansion of concrete. Prior to fabrication, submit certified test reports for the following tests specified in ASTM C 33

2.2.3.2 Alkali-Silica Reactivity

Evaluate and test fine and coarse aggregates to be used in all concrete for alkali-aggregate reactivity in accordance with ASTM C 1260. Test both coarse aggregate size groups if from different sources.

2.2.4 Grout

2.2.4.1 Nonshrink Grout

ASTM C 1107.

2.2.4.2 Cementitious Grout

Shall be a mixture of portland cement, sand, and water. Proportion one part cement to approximately 2.5 parts sand, with the amount of water based on placement method.

2.2.5 Admixtures

2.2.5.1 Air-Entraining

ASTM C 260.

2.2.5.2 Accelerating

ASTM C 494/ C 494M, Type C or E.

2.2.5.3 Water Reducing

ASTM C 494/ C 494M, Type A, E, or F.

2.2.6 Reinforcement

2.2.6.1 Reinforcing Bars

ASTM A 615/A 615M, Grade 60

2.2.6.2 Wire

ASTM A 82 or ASTM A 496.

2.2.7 Metal Accessories

Provide ASTM A 123/A 123M or ASTM A 153/A 153M galvanized.

2.2.7.1 Inserts

ASTM A 47/ A 47M, Grade 32510 or 35018, or ASTM A 27/A 27M Grade U-60-30.

2.3 PRODUCTION QUALITY CONTROL PROCEDURES

PCI MNL-116 unless specified otherwise.

2.3.1 Forms

Brace forms to prevent deformation. Forms shall produce a smooth, dense surface. Chamfer exposed edges of columns and beams 3/4 inch, unless otherwise indicated. Provide threaded or snap-off type form ties.

2.3.2 Reinforcement Placement

ACI 318/318R for placement and splicing. Reinforcement may be preassembled before placement in forms. Provide exposed connecting bars, or other approved connection methods, between precast and cast-in-place construction. Remove any excess mortar that adheres to the exposed connections.

2.3.3 Concrete

2.3.3.1 Concrete Mixing

ASTM C 94/ C 94M. Mixing operations shall produce batch-to-batch uniformity of strength, consistency, and appearance.

2.3.3.2 Concrete Placing

ACI 304R and ACI 309R, unless otherwise specified.

2.3.3.3 Concrete Curing

Commence curing immediately following the initial set and completion of surface finishing. Provide curing procedures to keep the temperature of the concrete between 50 and 190 degrees F. When accelerated curing is used, apply heat at controlled rate and uniformly along the casting beds. Monitor temperatures at various points in a product line in different casts.

2.3.4 Surface Finish

Repairs located in a bearing area shall be approved by the Owner prior to repairs. Precast structures containing hairline cracks which are visible and are less than 0.01 inches in width, may be accepted, except that cracks larger than 0.005 inches in width for surfaces exposed to the weather shall be repaired. Defects that involve more than 36 square inches of concrete shall be grounds for rejection. Any precast member that is structurally impaired or contains honeycombed section deep enough to expose stressing tendons or reinforcing shall be rejected. Defects shall be repaired or rejected as specified in paragraph "Defects."

2.3.4.1 Unformed Surfaces

Provide a steel troweled finish.

2.3.4.2 Formed Surfaces

PCI MNL-116 (Appendix A - Commentary), Chapter 3, for grades of surface finishes.

a. Unexposed Surfaces: Provide a standard grade surface finish.

b. Exposed Surfaces: Provide a standard grade surface finish

2.3.5 Acceptance/Rejection of Defects

2.3.5.1 Minor Defects

All honeycombed areas, chipped corners, air pockets over 1/4 inch in diameter, and other minor defects involve less than 36 square inches of concrete shall be repaired. Form offsets of fins over 1/8 inch shall be ground smooth. All unsound concrete shall be removed from defective areas prior to repairing. All surfaces permanently exposed to view shall be repaired by a blend of portland cement and white cement properly proportioned so that the final color when cured will be the same as adjacent concrete.

2.3.5.2 Major Defects

Major defects are those which involve more than 36 square inches of concrete or expose stressing tendons or reinforcing steel. If one or more major defects appear in a member, it shall be rejected. Cracks of a width of more than 0.01 inch shall be cause for rejection of the member.

2.4 TESTS, INSPECTIONS, AND VERIFICATIONS

2.4.1 Factory Inspection

At the option of the Owner, precast units may be inspected by the Owner prior to being transported to the job site. The Contractor shall give notice 14 days prior to the time the units will be available for plant inspection. Neither the exercise nor waiver of inspection at the plant will affect the Owner's right to enforce contractual provisions after units are transported or erected.

PART 3 - EXECUTION

3.1 EXAMINATION

Prior to erection, and again after installation, precast structures shall be checked for damage, such as cracking, spalling, and honeycombing. As directed by the Owner structures that do not meet the surface finish requirements specified in Part 2 in paragraph entitled "Surface Finish" shall be repaired, or removed and replaced with new precast structures.

3.2 ERECTION

Precast structures shall be erected after the concrete has attained the specified compressive strength, unless otherwise approved by the precast manufacturer. Erect in accordance with the approved shop drawings. PCI MNL-116 and PCI MNL-120 (Chapter 8), for tolerances. Provide a 1:500 tolerance, if no tolerance is specified. Brace precast structures, unless design calculations submitted with the shop drawings indicate bracing is not required. Follow the manufacturer's recommendations for maximum construction loads. Place precast structures level, plumb, square, and true within tolerances. Align member ends.

3.3 BEARING SURFACES

Shall be flat, free of irregularities, and properly sized. Size bearing surfaces to provide for the indicated clearances between the precast structures and adjoining field placed surfaces.

3.4 ANCHORAGE

Provide anchorage for fastening work in place. Conceal fasteners where practicable. Make threaded connections up tight and nick threads to prevent loosening.

3.5 OPENINGS

Holes or cuts requiring reinforcing to be cut, which are not indicated on the approved shop drawing, shall only be made with the approval of the Engineer and the precast manufacturer. Drill holes less than 12 inches in diameter with a diamond tipped core drill.

3.6 GALVANIZING REPAIR

Repair damage to galvanized coatings using ASTM A 780 zinc rich paint for galvanized surfaces damaged by handling, transporting, cutting, welding, bolting, or acid washing. Do not heat surfaces to which repair paint has been applied.

End of Section 03 41 00

SECTION 03 41 13 – PRECAST CONCRETE HOLLOW CORE PLANKS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes precast structural concrete.
- B. Section includes prestressed hollow core plank.

1.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design precast structural concrete, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Precast structural concrete units and connections shall withstand design loads indicated within limits and under conditions indicated.
 - 1. Fire-Resistance Rating: Select material and minimum thicknesses to provide indicated fire rating.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each precast concrete mixture.
- C. Shop Drawings: Include member locations, plans, elevation, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement. Detail fabrication and installation of precast structural concrete units.
- D. Delegated-Design Submittal: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Qualification Data: For Installer fabricator.
- F. Welding certificates.
- G. Material certificates.
- H. Material test reports.

- I. Source quality-control reports.
- J. Field quality-control reports.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
 - 1. Participates in PCI's Plant Certification program at time of bidding and is designated a PCI-certified plant as follows.
 - a. Croup C, Category C2 – Prestressed Hollowcore and Repetitively Produced Products.
- B. Design Standards: Comply with ACI 318 (ACI 318M) and design recommendations in PCI MNL 120, "PCI Design Handbook – Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.
- C. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products".
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D.1.1M, "Structural Welding Code – Steel."
- E. Fire-Resistance Calculations: Where indicated, provide precast structural concrete units whose fire resistance meets the prescriptive requirements of authorities having jurisdiction or has been calculated according to ACI 216.1/TMS 0216.1, "Standard Method for Determining Fire Resistance of Concrete and Masonry Construction Assemblies and is acceptable to authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Support units during shipment on nonstaining material in same position as during storage.
- B. Store units with adequate bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.
- C. Lift and support units only at designated points shown on Shop Drawings.

1.6 COORDINATION

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

PART 2 - PRODUCTS

2.1 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- C. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

2.2 PRESTRESSING TENDONS

- A. Strand: ASTM A 416/A 416M, Grade 270 (Grade 1860), uncoated, 7-wire, low-relaxation strand.

2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type III, gray, unless otherwise indicated.
- B. Supplementary Cementitious Materials:
 - 1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
 - 2. Metakaolin Admixture: ASTM C 618, Class N.
 - 3. Silica Fume Admixture: ASTM C 1240, with optional chemical and physical requirement.
 - 4. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- C. Normal-Weight Aggregates: except as modified by PCI MNL 116, ASTM C 33.
- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride or more than 0.15 percent chloride ions or other salts by weight of admixture.

2.4 STEEL CONNECTION MATERIALS

- A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.

- B. Carbon-Steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 116.
- C. Carbon-Steel Plate: ASTM A 283/A 283M.
- D. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706/A 706M.

2.5 BEARING PADS

- A. Provide bearing pads for precast structural concrete units as recommended by precast fabricator for application.

2.6 GROUT MATERIALS

- A. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 3 parts sand, by volume, with minimum water required for placement and hydration.

2.7 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
 - 1. Limit use of fly ash to 25 percent replacement of portland cement by weight and granulated blast-furnace slag to 40 percent of portland cement by weight.
- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.
- C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 116 when tested according to ASTM C 1218/C 1218M.
- D. Normal-Weight Concrete Mixtures: Proportion by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
 - 1. Compressive Strength (28 Days): 5000 psi (34.5 MPa) minimum.
 - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
- E. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 116.
- F. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.
- G. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.

- H. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

2.8 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
- B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast structural concrete units to supporting and adjacent construction.
- C. Cast-in slots, holes, and other accessories in precast structural concrete units as indicated on the Shop Drawings.
- D. Cast-in openings larger than 10 inches (250 mm) in any dimension. Do not drill or cut openings or prestressing strand without Fabricator's approval. Field cut openings to shown on Shop Drawings and approved by Fabricator and Architect.
- E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.
- F. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses.
- G. Prestress tendons for precast structural concrete units by pre-tensioning. Comply with PCI MNL 116.
- H. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
- I. Place concrete in a continuous operation to prevent seams or planes of weakness from Forming in precast concrete units.
- J. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour line, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 116.
- K. Comply with ACI 306.1 procedures for cold-weather concrete placement.
- L. Comply with PCI MNL 116 procedures for hot-weather concrete placement.

- M. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings.
- N. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.
- O. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, unless repairs meet requirements in PCI MNL 116 and meet Architect's approval.

2.9 FABRICATION TOLERANCES

- A. Fabricate precast structural concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 116 product dimension tolerances.

2.10 COMMERCIAL FINISHES

- A. Commercial Grade: remove fins and large protrusions and fill large holes. Rub or grind ragged edges. Faces must have true, well-defined surfaces. Air holes, water marks, and color variations are permitted. Limit form joint offsets to 3/16 inch (5mm).
- B. Standard Grade: Normal plant-run finish produced in molds that impart a smooth finish to concrete. Surface holes smaller than 1/2 inch (13 mm) caused by air bubbles, normal color variations, form joint marks, and minor chips and spalls are permitted. Fill air holes greater than 1/4 inch (6mm) in width that occur more than once per 2 sq. in (1300 sq. mm). Major or unsightly imperfections, honeycombs, or structural defects are not permitted. Limit joint offsets to 1/8 inch (3 mm).
- C. Grade B Finish: Fill air pockets and holes larger than 1/4 inch (6mm) in diameter with sand-cement paste matching color of adjacent surfaces. Fill air holes greater than 1/8 inch (3 mm) in width that occur more than once per 2 sq. in (1300 sq. mm). Grind smooth form offsets or fins larger than 1/8 inch (3 mm). Repair surface blemishes due to holes or dents in molds. Discoloration at form joints is permitted.
- D. Grade A Finish: Do not specify for hollow core or structural units.
- E. Screed or float finish unformed surfaces. Strike off and consolidate concrete with vibrating screeds to a uniform finish. Hand screed at projections. Normal color variations, minor indentions, minor chips, and spalls are permitted. Major imperfections, honeycombing, or defects are not permitted.
- F. Smooth, steel, trowel finish unformed surfaces. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.

- G. Apply roughened surface finish according to ACI 318 (ACI 318M) to precast concrete units that will received concrete topping after installation. Plant run finish for hollow core tops to receive structural topping is acceptable.

2.11 SOURCE QUALITY CONTROL

- A. Testing Test and inspect precast structural concrete according to PCI MNL 116 requirements.
- B. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval. Architect reserves the right to reject precast units that do not meet structural requirements.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and back up materials.
- B. Erect recast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, supports, and bracing as required to maintain position, stability, and alignment of units until permanent connection.
 - 1. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
 - 2. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
 - 3. For hollow-core slab voids used as electrical raceways or mechanical ducts, align voids between units and tape butt joint at end of slabs.
- C. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
- D. Field cutting of precast units is not permitted without approval of the Fabricator.
- E. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units unless approved by Fabricator.
- F. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
- G. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.

- H. Grouting: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on Shop Drawings. Retain grout in place until hard enough to support itself.

3.2 ERECTION TOLERANCES

- A. Erect precast structural concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.
- B. Minimize variations between adjacent slab members by jacking, loading, or other method recommended by fabricator and approved by Architect.

END OF SECTION 03 41 13

SECTION 03 52 16 - LIGHTWEIGHT INSULATING CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Cast-in-place perlite aggregate lightweight insulating concrete.
2. Cast-in-place vermiculite aggregate lightweight insulating concrete.
3. Cast-in-place cellular foam lightweight insulating concrete.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop drawings.
- C. Design mixtures.

1.3 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Evaluation reports.

1.4 QUALITY ASSURANCE

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 AGGREGATE LIGHTWEIGHT INSULATING CONCRETE

- A. Produce aggregate lightweight insulating concrete using the minimum amount of water necessary to produce a workable mix.
 1. Do not exceed maximum air content recommended by aggregate manufacturer.

- B. Perlite Aggregate Mix: Lightweight insulating concrete produced from cementitious materials, water, air-entraining admixture, and perlite mineral aggregates complying with ASTM C332, Group I.
1. As-Cast Unit Weight: 38 to 44 lb/cu. ft. at point of placement, when tested according to ASTM C138/C138M.
 2. Oven-Dry Unit Weight: 24 to 30 lb/cu. ft., when tested according to ASTM C495.
 3. Compressive Strength: Minimum 125 psi, when tested according to ASTM C495.
 4. Cement-to-Aggregate Ratio, by Volume: 1:6 .
- C. Vermiculite Aggregate Mix: Lightweight insulating concrete produced from cementitious materials, water, air-entraining admixture, and vermiculite mineral aggregates complying with ASTM C332, Group I.
1. Asbestos Content: No detectable asbestos as determined by method specified in 40 CFR 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy."
 2. As-Cast Unit Weight: 45 to 49 lb/cu. ft. at point of placement, when tested according to ASTM C138/C138M.
 3. Oven-Dry Unit Weight: 23 to 26 lb/cu. ft., when tested according to ASTM C495.
 4. Compressive Strength: Minimum 140 psi, when tested according to ASTM C495.
 5. Cement-to-Aggregate Ratio, by Volume: 1:6 .

2.3 CELLULAR LIGHTWEIGHT INSULATING CONCRETE

- A. Produce cellular lightweight insulating concrete with the following minimum physical properties using cementitious materials, air-producing liquid-foaming agents complying with ASTM C869/C869M, and the minimum amount of water necessary to produce a workable mix:
1. As-Cast Unit Weight: 34 to 42 lb/cu. ft. at point of placement, when tested according to ASTM C138/C138M.
 2. Oven-Dry Unit Weight: 26 to 32 lb/cu. ft., when tested according to ASTM C495.
 3. Compressive Strength: Minimum 190 psi, when tested according to ASTM C495.

2.4 MATERIALS

- A. Cementitious Material: Portland cement, ASTM C150/C150M, Type I/II . Supplement with fly ash, ASTM C618, Class C or F.
- B. Water: Clean, potable.

2.5 DESIGN MIXTURES

- A. Prepare design mixtures for each type and strength of lightweight insulating concrete by laboratory trial batch method or by field-test data method. For trial batch method, use a qualified independent testing agency for preparing and reporting proposed mixture designs.

1. Limit use of fly ash to not exceed 25 percent of portland cement by weight.
- B. Limit water-soluble chloride ions to the maximum percentage by weight of cement or cementitious material permitted by ACI 301.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Control Joints: Install control joints at perimeter of roof deck and at junctures with vertical surfaces, including curbs, walls, and vents, for full depth of lightweight insulating concrete. Fill control joints with joint filler.
 1. Provide 1-inch- wide control joints for roof dimensions up to 100 feet in length; 1-1/2-inch- wide control joints for roof dimensions exceeding 100 feet.
- B. Wire Mesh: Place steel wire mesh with longest dimension perpendicular to steel deck ribs. Cut mesh to fit around roof openings and projections. Terminate mesh at control joints. Lap sides and ends of mesh at least 6 inches.
- C. Welded Wire Reinforcement: Place steel welded wire reinforcement with longest dimension perpendicular to steel deck ribs. Cut reinforcement to fit around roof openings and projections. Terminate reinforcement at control joints. Lap sides and ends of reinforcement at least 6 inches.

3.2 MIXING AND PLACING

- A. Mix and place lightweight insulating concrete according to manufacturer's written instructions, using equipment and procedures to avoid segregation of mixture and loss of air content.
- B. Install insulation board according to lightweight insulating concrete manufacturer's written instructions. Place insulation board in wet, lightweight insulating concrete slurry poured a minimum of 1/8 inch over the structural substrate. Ensure full contact of insulation board with slurry. Stagger joints and tightly butt insulation boards. Allow slurry coat to set prior to placing remaining thickness of lightweight insulating concrete.
 1. Install insulation board in a stair-step configuration with a maximum step-down of 1 inch.
- C. Deposit and screed lightweight insulating concrete in a continuous operation until an entire panel or section of roof area is completed. Do not vibrate or work mix except for screeding or floating. Place to depths and slopes indicated.
- D. Finish top surface smooth, free of ridges and depressions, and maintain surface in condition to receive subsequent roofing system.
- E. Begin curing operations immediately after placement, and air cure for not less than three days, according to manufacturer's written instructions.

- F. If ambient temperature falls below 32 deg F, protect lightweight insulating concrete from freezing and maintain temperature recommended by manufacturer for 72 hours after placement.

END OF SECTION 03 52 16

SECTION 04 20 00 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Clay face brick.
2. Mortar and grout.
3. Ties and anchors.
4. Embedded flashing.
5. Miscellaneous masonry accessories.

B. Products Installed but not Furnished under This Section:

1. Cast-stone trim in unit masonry.
2. Steel lintels in unit masonry.
3. Steel shelf angles for supporting unit masonry.
4. Cavity wall insulation.

C. Related Requirements:

1. Section 05 12 00 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
2. Section 07 21 00 "Thermal Insulation" for cavity wall insulation.
3. Section 07 62 00 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

1.3 DEFINITIONS

- A. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.
 - 3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.
- C. Samples for Verification: For each type and color of the following:
 - 1. Clay face brick, in the form of straps of five or more bricks.
 - 2. Special brick shapes.
 - 3. Pigmented and colored-aggregate mortar. Make Samples using same sand and mortar ingredients to be used on Project.
 - 4. Weep holes and cavity vents.
 - 5. Accessories embedded in masonry.

1.6 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of the following:
 - 1. Masonry units.
 - a. Include data on material properties.
 - b. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
 - c. For exposed brick, include test report for efflorescence according to ASTM C67.
 - 2. Mortar admixtures.
 - 3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 - 4. Grout mixes. Include description of type and proportions of ingredients.
 - 5. Anchors, ties, and metal accessories.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 - 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
 - 2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

1.7 QUALITY ASSURANCE

- A. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 01 40 00 "Quality Requirements" for mockups.
1. Build sample panels on site, at locations directed by Design Professional.
 2. Size: Approximately 5 feet in length and 4 foot return x 4 feet height x full thickness, face, back-up wythes and accessories of the following: Each specified brick, typical exterior brick wall, interior brick veneer, backed by each type of CMU, specified mortar(s), damp proofing, insulation, Electrical receptacle, Window jamb and sill, joint reinforcing. Coordinate sample window and sample Cast stone, to delivered at time of mock-up. Grout top of wall panel.
 - a. Typical interior brick wall.
 - b. Typical interior CMU partition.
 - c. Joint types:
 - 1) Brick: Concave joint
 - 2) CMU: Concave joint
 3. Clean exposed faces of panels with masonry cleaner indicated.
 4. Protect approved sample panels from the elements with weather-resistant membrane.
 5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Design Professional in writing.
 - a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Design Professional specifically approves such deviations in writing.
 6. Retain during construction for judging completed work.
 7. When directed, demolish, remove from site. Including roof mock up.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls, and hold cover securely in place.
 - 2. Where one wythe of multi wythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe, and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide unit masonry that develops indicated net-area compressive strengths at 28 days.
 - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
 - 2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C1314.

2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.

2.4 BRICK

- A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
 - 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 - 2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including those at corners, movement joints, bond beams, sashes, and lintels.
 - 3. Provide special shapes for applications requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing.
 - 4. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- B. Clay Face Brick: Facing brick complying with ASTM C216.

1. A budget of \$460 per 1,000 brick shall be used. Selection shall be determined by Design Professional. Budget price applies to field brick only. All required special shapes to match face brick shall be included in base bid.
2. Grade: MW or SW.
3. Type: FBS.
4. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3000 psi.
5. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested according to ASTM C67.
6. Efflorescence: Provide brick that has been tested according to ASTM C67 and is rated "not effloresced."
7. Size (Actual Dimensions): 3-5/8 inches wide by 2-1/4 inches high by 7-5/8 inches long.
8. Application: Use where brick is exposed unless otherwise indicated.
9. Color and Texture: As selected by Architect. Interior and exterior brick shall be different selections.

2.5 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Mortar Cement: ASTM C1329/C1329M.
- E. Colored Cement Products: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 1. Colored Portland Cement-Lime Mix:
 - a. Argos USA; Superbond Mortar Cement (basis-of-design: Ivory Buff).
 - b. Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
 - c. Lafarge North America Inc.; Eaglebond.
 - d. Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
 - e. SPEC MIX; Portland Cement and Sand Mortar Cement.
- F. Aggregate for Mortar: ASTM C144.
 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 3. White-Mortar Aggregates: Natural white sand or crushed white stone.

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4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
 - G. Aggregate for Grout: ASTM C404.
 - H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
 1. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - a. Euclid Chemical Company (The); Accelguard 80.
 - b. GCP Applied Technologies; Morset.
 - I. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.
 1. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - a. Euclid Chemical Company (The); Eucon Hydrapel 2.0.
 - b. GCP Applied Technologies; Dry-Block Mortar Admixture
 - c. Master Builders Solutions – a BASF company; Color Cure Mortar Admix or Rheomix Rheope
 - J. Water: Potable.

2.6 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches into veneer but with at least a 5/8-inch cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
 1. Stainless Steel Wire: ASTM A580/A580M, Type 304.
 2. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304.
 3. Stainless Steel Bars: ASTM A276 or ASTM A666, Type 304.
- C. Rigid Anchors: Fabricate from steel bars 1-1/2 inches wide by 1/4 inch thick by 24 inches long, with ends turned up 2 inches or with cross pins unless otherwise indicated.
 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A153/A153M.
- D. Adjustable Masonry-Veneer Anchors:
 1. General: Provide anchors that allow vertical adjustment but resist a 100-lbf load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of 1/16 inch.

2. Fabricate sheet metal anchor sections and other sheet metal parts from 0.075-inch-thick steel sheet, galvanized after fabrication.
3. Fabricate wire ties from 0.187-inch-diameter, hot-dip galvanized-steel wire unless otherwise indicated.
4. Screw-Attached, Masonry-Veneer Anchors: Wire tie and a sheet metal anchor section, 1-1/4 inches wide by 6 inches long, with screw holes top and bottom and with raised rib-stiffened strap, 5/8 inch wide by 3-5/8 inches long, stamped into center to provide a slot between strap and base for inserting wire tie.
 - a. Hohmann & Barnard, Inc.; X-Seal.
5. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length required to penetrate steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours according to ASTM B117.

2.7 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
 1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch thick.
 2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
 3. Fabricate through-wall flashing with drip edge where indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees.
 4. Fabricate metal drip edges from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees.
- B. Flexible Flashing: Use one of the following unless otherwise indicated:
 1. Laminated Stainless Steel Fabric Flashing, Non-Asphaltic: Stainless steel core with polymer fabric laminated to one stainless steel face with non-asphalt adhesive. Provide with manufacturer recommended accessory items for a complete compatible system.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Hohman and Bernard, Inc.; Mighty-Flash Stainless Steel Fabric Flashing.
 - 2) York Manufacturing, Inc.; Multi-Flash SS
 - 3) STS Coatings, Inc.; Gorilla Flash Stainless Fabric
 - 4) Illinois Products, Inc.; IPCO Stainless Steel Fabric Flashing
 - 5) TK Products, Inc.; TK TWF
 2. Accessories: Provide preformed inside and outside corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.
- C. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing or flexible flashing with a metal drip edge .
4. Where flashing is fully concealed, use flexible flashing.

D. Solder and Sealants for Sheet Metal Flashings:

1. Solder for Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.

E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

F. Termination Bars for Flexible Flashing: Stainless steel bars 1/8 inch by 1 inch.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene or urethane.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

D. Weep/Cavity Vent Products: Use the following unless otherwise indicated:

1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.
 - a. Advanced Building Products Inc.; Mortar Maze weep vent.
 - b. Dayton Superior Corporation, Dur-O-Wal Division; Cell Vents.
 - c. Heckmann Building Products Inc.; No. 85 Cell Vent.
 - d. Hohmann & Barnard, Inc.; Quadro-Vent.
 - e. Wire-Bond; Cell Vent.

E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.

1. Products:

- a. Advanced Building Products Inc.; Mortar Break (1-3/4 inch air space) or Mortar Break II (2 inch airspace).
- b. Dayton Superior Corporation, Dur-O-Wal Division; Polytite MortarStop.
- c. Mortar Net USA, Ltd.; Mortar Net.
- d. Archovations, Inc.; CavClear Masonry Mat.

2.9 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem, Inc.
 - c. ProSoCo, Inc

2.10 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 1. Do not use calcium chloride in mortar or grout.
 2. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 1. For masonry below grade or in contact with earth, use Type M.
 2. For reinforced masonry, use Type S.
 3. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
 4. For interior nonload-bearing partitions, Type O may be used instead of Type N.
- D. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
 1. Pigments shall not exceed 10 percent of portland cement by weight.

2. Mix to match Architect's sample.
- E. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
1. Mix to match Architect's sample.
- F. Grout for Unit Masonry: Comply with ASTM C476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
 2. Verify that foundations are within tolerances specified.
 3. Verify that reinforcing dowels are properly placed.
 4. Verify that substrates are free of substances that impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping connections.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- D. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2- inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet 3/8 inch in 20 feet, or 1/2- inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2- inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2- inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet or 1/2- inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond except as indicated on Drawings; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than. Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4- inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick as follows:
 - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
 - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
 - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
 - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
 - 5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.
- B. Lay solid masonry units and hollow brick with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. cast-stone Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush where indicated to receive waterproofing cavity wall insulation air barriers unless otherwise indicated.

3.6 CAVITY WALLS

- A. Bond wythes of cavity walls together as follows:
 - 1. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.

- b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties.
 - c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.
2. Header Bonding: Provide masonry unit headers extending not less than 3 inches into each wythe. Space headers not more than 8 inches clear horizontally and 16 inches clear vertically.
 3. Masonry-Veneer Anchors: Comply with requirements for anchoring masonry veneers.
- B. Bond wythes of cavity walls together using bonding system indicated on Drawings.
- C. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.
- D. Parge cavity face of backup wythe in a single coat approximately 3/8 inch thick. Trowel face of parge coat smooth.
- E. Installing Cavity Wall Insulation: Place small dabs of adhesive, spaced approximately 12 inches o.c. both ways, on inside face of insulation boards, or attach with plastic fasteners designed for this purpose. Fit courses of insulation between wall ties and other confining obstructions in cavity, with edges butted tightly both ways. Press units firmly against inside wythe of masonry or other construction as shown.
1. Fill cracks and open gaps in insulation with crack sealer compatible with insulation and masonry.

3.7 ANCHORED MASONRY VENEERS

- A. Anchor masonry veneers to concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:
1. Fasten anchors to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
 2. Embed connector sections and continuous wire in masonry joints.
 3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 4. Space anchors as indicated, but not more than 16 inches o.c. vertically and 25 inches o.c. horizontally, with not less than one anchor for each 2.67 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 36 inches, around perimeter.
- B. Provide not less than 2 inches of airspace between back of masonry veneer and face of insulation.

1. Keep airspace clean of mortar droppings and other materials during construction. Bevel beds away from airspace, to minimize mortar protrusions into airspace. Do not attempt to trowel or remove mortar fins protruding into airspace.

3.8 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 1. Space reinforcement not more than 16 inches o.c.
 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at corners by using prefabricated L-shaped units.
- D. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.9 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form expansion joints in brick as follows:
 1. Build flanges of metal expansion strips into masonry. Lap each joint 4 inches in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
 2. Build flanges of factory-fabricated, expansion-joint units into masonry.
 3. Build in compressible joint fillers where indicated.
 4. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of sealant and backer rod specified in Section 07 92 00 "Joint Sealants."
- C. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 07 92 00 "Joint Sealants," but not less than 3/8 inch.
 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.10 LINTELS

- A. Install steel lintels where indicated.

3.11 FLASHING, WEEP HOLES, AND CAVITY VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape.
 2. At masonry-veneer walls, extend flashing through veneer, across airspace behind veneer, and up face of sheathing at least 8 inches; with upper edge tucked under air barrier, lapping at least 4 inches. Fasten upper edge of flexible flashing to sheathing through termination bar.
 3. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
 4. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 07 92 00 "Joint Sealants" for application indicated.
 5. Install metal drip edges with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 07 92 00 "Joint Sealants" for application indicated.
 6. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall and adhere flexible flashing to top of metal drip edge.
- C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.
- D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.
- E. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.
1. Use specified weep/cavity vent products to form weep holes.
 2. Space weep holes 24 inches o.c. unless otherwise indicated.
- F. Place cavity drainage material in airspace behind veneers to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

3.12 REINFORCED UNIT MASONRY

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
 - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 60 inches.

3.13 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

3.14 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.

2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Design Professional's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
6. Clean stone trim to comply with stone supplier's written instructions.
7. Methods not indicated in this Specification shall be included with the Action Submittals for review and approval.

3.15 MASONRY WASTE DISPOSAL

- A. Excess Masonry Waste: Remove excess clean masonry waste and legally dispose of off Owner's property.

END OF SECTION 04 20 00

SECTION 04 22 00 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Steel reinforcing bars.

1.2 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.

1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of product. For masonry units, include data on material properties and material test reports substantiating compliance with requirements.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
 2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.

1.5 QUALITY ASSURANCE

1.6 FIELD CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
 - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- B. Integral Water Repellent: Provide units made with integral water repellent for exposed units and where indicated.
- C. CMUs: ASTM C90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi .
 - 2. Density Classification: Lightweight .

2.3 CONCRETE LINTELS

- A. Concrete Lintels: ASTM C1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength not less than that of CMUs.

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C91/C91M.
- E. Aggregate for Mortar: ASTM C144.
 - 1. White-Mortar Aggregates: Natural white sand or crushed white stone.
 - 2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- F. Aggregate for Grout: ASTM C404.
- G. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C494/C494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- H. Water: Potable.

2.5 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60.
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
- C. Masonry-Joint Reinforcement, General: ASTM A951/A951M.
 - 1. Interior Walls: Hot-dip galvanized, carbon steel.
 - 2. Exterior Walls: Hot-dip galvanized carbon steel.
 - 3. Wire Size for Side Rods: 0.148-inch diameter.
 - 4. Wire Size for Cross Rods: 0.148-inch diameter.

5. Spacing of Cross Rods: Not more than 16 inches o.c.
6. Provide in lengths of not less than 10 feet , with prefabricated corner and tee units.

2.6 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
1. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.016 inch thick.
 2. Copper: ASTM B370, Temper H00, cold-rolled copper sheet, 16-oz./sq. ft. weight or 0.0216 inch thick or ASTM B370, Temper H01, high-yield copper sheet, 12-oz./sq. ft. weight or 0.0162 inch thick.
 3. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
 4. Fabricate metal drip edges from stainless steel. Extend at least 3 inches into wall and 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
 5. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch and down into joint 1/4 inch to form a stop for retaining sealant backer rod.
 6. Fabricate metal expansion-joint strips from stainless steel copper to shapes indicated.
- B. Flexible Flashing: Use one of the following unless otherwise indicated:
1. Copper-Laminated Flashing: 5-oz./sq. ft. copper sheet bonded between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.
 2. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.030 inch .
 3. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.030 inch.
 4. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.
 5. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D4637/D4637M, 0.040 inch thick.
- C. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar.
- D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 07 62 00 "Sheet Metal Flashing and Trim."
- E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.7 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D2000, Designation M2AA-805 or PVC, complying with ASTM D2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
- C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

2.8 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use portland cement-lime or masonry cement mortar unless otherwise indicated.
 - 3. For exterior masonry, use portland cement-lime or masonry cement mortar.
 - 4. For reinforced masonry, use portland cement-lime or masonry cement mortar.
 - 5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated.
 - 1. For masonry below grade or in contact with earth, use Type S.
 - 2. For reinforced masonry, use Type S .
 - 3. For mortar parge coats, use Type S .
- D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
- E. Grout for Unit Masonry: Comply with ASTM C476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 - 2. Proportion grout in accordance with ASTM C476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 3000 psi .

3. Provide grout with a slump of 8 to 10 inches as measured according to ASTM C143/C143M.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.2 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in stacked bond; do not use units with less-than-nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- E. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- F. Fill cores in hollow CMUs with grout 24 inches under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.4 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
 - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
 - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
 - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
- B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

3.5 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.

2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.

3.6 FLASHING

- A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.
- B. Install flashing as follows unless otherwise indicated:
1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 2. At lintels, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
 3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
 4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.
- C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

3.7 REINFORCED UNIT MASONRY

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.

2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 2. Limit height of vertical grout pours to not more than 60 inches .

3.8 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
 3. Place grout only after inspectors have verified proportions of site-prepared grout.
- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.
- G. Mortar Test (Property Specification): For each mix provided, according to ASTM C780. Test mortar for .
- H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C1019.
- I. Prism Test: For each type of construction provided, according to ASTM C1314 at 28 days.

3.9 PARGING

- A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4 inch. Dampen wall before applying first coat, and scarify first coat to ensure full bond to subsequent coat.
- B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot. Form a wash at top of parging and a cove at bottom.
- C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.10 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
 - 2. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.11 MASONRY WASTE DISPOSAL

- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
 - 1. Do not dispose of masonry waste as fill within 18 inches of finished grade.
- B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 22 00

SECTION 04 72 00 - CAST STONE MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Cast-stone trim.

- B. Related Sections:

- 1. Section 04 20 00 "Unit Masonry" for installing cast-stone units in unit masonry.

1.3 ACTION SUBMITTALS

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

- 1. For cast-stone units, include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

- B. Shop Drawings: Show fabrication and installation details for cast-stone units. Include dimensions, details of reinforcement and anchorages if any, and indication of finished faces.

- 1. Include building elevations showing layout of units and locations of joints and anchors.

- C. Samples for Verification:

- 1. For each color and texture of cast stone required, 10 inches square in size.
 - 2. For each trim shape required, 10 inches in length.
 - 3. For colored mortar, make Samples using same sand and mortar ingredients to be used on Project.

- D. Full-Size Samples: For each color texture and shape of cast-stone unit required.

- 1. Make available for Architect's review at Project site.
 - 2. Make Samples from materials to be used for units used on mockup.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

1. Include copies of material test reports for completed projects, indicating compliance of cast stone with ASTM C1364.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer of cast-stone units similar to those indicated for this Project, that has sufficient production capacity to manufacture required units, and is a plant certified by the Cast Stone Institute.
- B. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- C. Mockups: Furnish cast stone for installation in mockups specified in Section 04 20 00 "Unit Masonry."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery of cast stone to avoid delaying the Work.

B. Pack, handle, and ship cast-stone units in suitable packs or pallets.

1. Lift with wide-belt slings; do not use wire rope or ropes that might cause staining. Move cast-stone units if required, using dollies with wood supports.
2. Store cast-stone units on wood skids or pallets with nonstaining, waterproof covers, securely tied. Arrange to distribute weight evenly and to prevent damage to units. Ventilate under covers to prevent condensation.

C. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

D. Store mortar aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

1.7 PROJECT CONDITIONS

A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Comply with cold-weather construction requirements in TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and above and will remain so until cast stone has dried, but no fewer than seven days after completing cleaning.

- B. Hot-Weather Requirements: Comply with hot-weather construction requirements in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Cast Stone: Obtain cast-stone units from single source from single manufacturer.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color, from one manufacturer for each cementitious component and from one source or producer for each aggregate.

2.2 CAST-STONE MATERIALS

- A. General: Comply with ASTM C1364.
- B. Portland Cement: ASTM C150/C150M, Type I or Type III, containing not more than 0.60 percent total alkali when tested according to ASTM C114. Provide natural color or white cement as required to produce cast-stone color indicated.
- C. Coarse Aggregates: Granite, quartz, or limestone complying with ASTM C33/C33M; gradation and colors as needed to produce required cast-stone textures and colors.
- D. Fine Aggregates: Natural sand or crushed stone complying with ASTM C33/C33M, gradation and colors as needed to produce required cast-stone textures and colors.
- E. Color Pigment: ASTM C979/C979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
- F. Admixtures: Use only admixtures specified or approved in writing by Architect.
1. Do not use admixtures that contain more than 0.1 percent water-soluble chloride ions by mass of cementitious materials. Do not use admixtures containing calcium chloride.
 2. Use only admixtures that are certified by manufacturer to be compatible with cement and other admixtures used.
- G. Reinforcement: Deformed steel bars complying with ASTM A615/A615M, Grade 60. Use galvanized or epoxy-coated reinforcement when covered with less than 1-1/2 inches of cast-stone material.
1. Epoxy Coating: ASTM A775/A775M.
 2. Galvanized Coating: ASTM A767/A767M.

- H. Embedded Anchors and Other Inserts: Fabricated from stainless steel complying with ASTM A240/A240M, ASTM A276, or ASTM A666, Type 304.

2.3 CAST-STONE UNITS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Advanced Architectural Stone, Inc. (Fort Worth, Texas)
2. Bassco Caststone (Elkmont, Alabama)
3. Cast Stone Systems, Inc. (Warrenton, North Carolina)
4. Dallas Cast Stone Company (Dallas, Texas)
5. Stone Legends, Inc. (Dallas, Texas)
6. Southern Castings, Inc. (Valdosta, Georgia)

- B. Cast-Stone Units: Comply with ASTM C1364.

1. Units shall be manufactured using the vibrant dry tamp method.
2. Units shall be resistant to freezing and thawing as determined by laboratory testing according to ASTM C666/C666M, Procedure A, as modified by ASTM C1364.

- C. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.

1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
3. Provide drips on projecting elements unless otherwise indicated.

- D. Fabrication Tolerances:

1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch, whichever is greater, but in no case by more than 1/4 inch.
3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.
4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.

- E. Cure Units as Follows:

1. Cure units in enclosed, moist curing room at 95 to 100 percent relative humidity and temperature of 100 deg F for 12 hours or 70 deg F for 16 hours.
2. Keep units damp and continue curing to comply with one of the following:
 - a. No fewer than five days at mean daily temperature of 70 deg F or above.
 - b. No fewer than six days at mean daily temperature of 60 deg F or above.
 - c. No fewer than seven days at mean daily temperature of 50 deg F or above.

- d. No fewer than eight days at mean daily temperature of 45 deg F or above.
- F. Acid etch units after curing to remove cement film from surfaces to be exposed to view.
- G. Colors and Textures: As selected by Design Professional from manufacturer's full range.

2.4 MORTAR MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Colored Cement Product: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 - 1. Colored Masonry Cement:
 - a. Argos USA; Superbond Mortar Cement.
 - b. Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
 - c. Lafarge North America Inc.; Eaglebond.
 - d. Lehigh Cement Company; Lehigh Custom Color Portland/Lime Cement.
 - e. SPEC MIX; Portland Cement and Sand Mortar Cement.
 - 2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
 - 3. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
- E. Aggregate for Mortar: ASTM C144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
 - 3. White-Mortar Aggregates: Natural white sand or crushed white stone.
 - 4. Colored Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- F. Water: Potable.

2.5 ACCESSORIES

- A. Anchors: Type and size indicated, fabricated from Type 304 stainless steel complying with ASTM A240/A240M, ASTM A276, or ASTM A666.
- B. Dowels: 1/2-inch- diameter round bars, fabricated from Type 304 stainless steel complying with ASTM A240/A240M, ASTM A276, or ASTM A666.
- C. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cast-stone manufacturer and expressly approved by cleaner manufacturer for use on cast stone and adjacent masonry materials.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem, Inc.
 - c. Prosoco, Inc.

2.6 MORTAR MIXES

- A. Do not use admixtures including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
 - 2. Use masonry cement or mortar cement mortar unless otherwise indicated.
- B. Comply with ASTM C270, Proportion Specification.
 - 1. For setting mortar, use Type N.
 - 2. For pointing mortar, use Type N.
- C. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
 - 1. Pigments shall not exceed 10 percent of portland cement by weight.
 - 2. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
 - 3. Mix to match Architect's sample.
 - 4. Application: Use pigmented mortar for exposed mortar joints.
- D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
 - 1. Mix to match Architect's sample.
 - 2. Application: Use colored-aggregate mortar for exposed mortar joints.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 SETTING CAST STONE IN MORTAR

- A. Set cast stone as indicated on Drawings. Set units accurately in locations indicated, with edges and faces aligned according to established relationships and indicated tolerances.
 - 1. Install anchors, supports, fasteners, and other attachments indicated or necessary to secure units in place.
 - 2. Coordinate installation of cast stone with installation of flashing specified in other Sections.
- B. Wet joint surfaces thoroughly before applying mortar or setting in mortar.
- C. Set units in full bed of mortar with full head joints unless otherwise indicated.
 - 1. Set units with joints 1/4 to 3/8 inch wide unless otherwise indicated.
 - 2. Build anchors and ties into mortar joints as units are set.
 - 3. Fill dowel holes and anchor slots with mortar.
 - 4. Fill collar joints solid as units are set.
 - 5. Build concealed flashing into mortar joints as units are set.
 - 6. Keep head joints in copings and between other units with exposed horizontal surfaces open to receive sealant.
 - 7. Keep joints at shelf angles open to receive sealant.
- D. Rake out joints for pointing with mortar to depths of not less than 3/4 inch. Rake joints to uniform depths with square bottoms and clean sides. Scrub faces of units to remove excess mortar as joints are raked.
- E. Point mortar joints by placing and compacting mortar in layers not greater than 3/8 inch. Compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
- F. Tool exposed joints slightly concave when thumbprint hard. Use a smooth plastic jointer larger than joint thickness.
- G. Rake out joints for pointing with sealant to depths of not less than 3/4 inch. Scrub faces of units to remove excess mortar as joints are raked.
- H. Point joints with sealant to comply with applicable requirements in Section 07 92 00 "Joint Sealants."

1. Prime cast-stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
- I. Provide sealant joints at head joints of copings and other horizontal surfaces; at expansion, control, and pressure-relieving joints; and at locations indicated.
 1. Keep joints free of mortar and other rigid materials.
 2. Build in compressible foam-plastic joint fillers where indicated.
 3. Form joint of width indicated, but not less than 3/8 inch.
 4. Prime cast-stone surfaces to receive sealant and install compressible backer rod in joints before applying sealant unless otherwise indicated.
 5. Prepare and apply sealant of type and at locations indicated to comply with applicable requirements in Section 07 92 00 "Joint Sealants."

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb: Do not exceed 1/8 inch in 15 feet, or 7/16 inch maximum.
- B. Variation from Level: Do not exceed 1/8 inch in 15 feet, or 7/16 inch maximum.
- C. Variation in Joint Width: Do not vary joint thickness more than 1/8 inch in 48 inches or one-fourth of nominal joint width, whichever is less.
- D. Variation in Plane between Adjacent Surfaces (Lipping): Do not vary from flush alignment with adjacent units or adjacent surfaces indicated to be flush with units by more than 1/16 inch, except where variation is due to warpage of units within tolerances specified.

3.4 ADJUSTING AND CLEANING

- A. Remove and replace stained and otherwise damaged units and units not matching approved Samples. Cast stone may be repaired if methods and results are approved by Architect.
- B. Replace units in a manner that results in cast stone matching approved Samples, complying with other requirements, and showing no evidence of replacement.
- C. In-Progress Cleaning: Clean cast stone as work progresses.
 1. Remove mortar fins and smears before tooling joints.
 2. Remove excess sealant immediately, including spills, smears, and spatter.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed cast stone as follows:
 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Test cleaning methods on sample; leave one sample uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of cast stone.

3. Protect adjacent surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet surfaces with water before applying cleaners; remove cleaners promptly by rinsing thoroughly with clear water.
5. Clean cast stone with proprietary acidic cleaner applied according to manufacturer's written instructions.
6. Methods not indicated in this Specification shall be included with the Action Submittals for review and approval.

END OF SECTION 04 72 00

SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Structural steel.
2. Shear stud connectors.
3. Shrinkage-resistant grout.

1.2 DEFINITIONS

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

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

1.4 ACTION SUBMITTALS

A. Product Data:

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

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

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Mill test reports for structural-steel materials, including chemical and physical properties.
- C. Source quality-control reports.
- D. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Fabricator and Erector Qualifications:

1. Fabricator and erector must have a minimum of five years of experience with a proven record of satisfactory work.
2. Fabricator and erector must have had work of similar type of construction to be considered as “satisfactory work.”
3. The Architect shall be the sole judge as to whether the fabricator and erector satisfactorily meets these requirements.
4. “Steel Fabricator” and “Steel Erector” shall be an organized steel company engaged in this type of work.
5. If any fabricator or steel erector is doubtful as to whether they meet these requirements, they may submit information to the Architect at least 10 days before the bid opening in order to qualify.

B. Welding Qualifications:

1. Qualify welding procedures and welding operators in accordance with AWS “Qualification” requirements.
2. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests within the previous 12 months.
3. If recertification of welders is required, retesting will be the Contractor’s responsibility and shall be at no cost to the Owner.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with applicable provisions of the following specifications and documents:

1. ANSI/AISC 303.
2. ANSI/AISC 360.
3. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A992/A992M .
- B. Channels, Angles , M-Shapes , S-Shapes : ASTM A36/A36M .

- C. Plate and Bar: ASTM A36/A36M .
- D. Cold-Formed Hollow Structural Sections: ASTM A500/A500M, Grade B structural tubing.
- E. Steel Pipe: ASTM A53/A53M, Type E or Type S, Grade B.
- F. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

- A. High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressible-washer type with plain finish.
- B. Zinc-Coated High-Strength A325 Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
 - 1. Finish: Hot-dip zinc coating .
 - 2. Direct-Tension Indicators: ASTM F959/F959M, Type 325-1, compressible-washer type with mechanically deposited zinc coating finish.
- C. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125/F3125M, Grade F1852, Type 1, heavy-hex head assemblies, consisting of steel structural bolts with splined ends; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
 - 1. Finish: Plain .
- D. Shear Stud Connectors: ASTM A108, AISI C-1015 through C-1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

2.4 RODS

- A. Unheaded Anchor Rods: ASTM F1554, Grade 36 .
 - 1. Configuration: Straight .
 - 2. Finish: Plain .
- B. Headed Anchor Rods: ASTM F1554, Grade 36 , straight.
 - 1. Finish: Plain .
- C. Threaded Rods: ASTM A36/A36M .

1. Finish: Plain .

2.5 SHRINKAGE-RESISTANT GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.
- B. Shear Stud Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Weld using automatic end welding of headed-stud shear connectors in accordance with AWS D1.1/D1.1M and manufacturer's written instructions.

2.7 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 1. Joint Type: Snug tightened .
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel in accordance with ASTM A123/A123M.
 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
 1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
 2. Bolted Connections: Inspect shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."

3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E165/E165M.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E164.
 - d. Radiographic Inspection: ASTM E94/E94M.
4. In addition to visual inspection, test and inspect shop-welded shear stud connectors in accordance with requirements in AWS D1.1/D1.1M.
5. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Baseplates Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 2. Weld plate washers to top of baseplate.
 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 4. Promptly pack shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for grouting.
- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

3.3 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.

1. Joint Type: Snug tightened .
 - B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
- 3.4 FIELD QUALITY CONTROL
- A. Special Inspections: Owner will engage a special inspector to perform the following special inspections:
 1. Verify structural-steel materials and inspect steel frame joint details.
 2. Verify weld materials and inspect welds.
 3. Verify connection materials and inspect high-strength bolted connections.
 - B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
 1. Bolted Connections: Inspect bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
 2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
 - a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1) Liquid Penetrant Inspection: ASTM E165/E165M.
 - 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3) Ultrasonic Inspection: ASTM E164.
 - 4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION 05 12 00

SECTION 05 21 00 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. K-series steel joists.
2. K-series steel joist substitutes.
3. LH-series long-span steel joists.
4. DLH-series long-span steel joists.
5. Steel joist accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of joist, accessory, and product.

B. Shop Drawings:

1. Include layout, designation, number, type, location, and spacing of joists.
2. Include joining and anchorage details; bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Manufacturer certificates.

C. Mill Certificates: For each type of bolt.

D. Field quality-control reports.

1.4 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 STEEL JOISTS

- A. K-Series Steel Joist: Manufactured steel joists of type indicated according to "Standard Specification for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
1. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.
- B. Long-Span Steel Joist: Manufactured steel joists according to "Standard Specification for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as indicated on Drawings.

2.3 PRIMERS

- A. Primer:
1. SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.
2. Primer: Provide shop primer that complies with

2.4 STEEL JOIST ACCESSORIES

- A. Bridging:
1. Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.
- B. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction.
1. Extend ends to within 1/2 inch of finished wall surface unless otherwise indicated on Drawings.
- C. High-Strength Bolts, Nuts, and Washers: ASTM F3125/F3125M, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F436/F436M, Type 1, hardened carbon-steel washers.
1. Finish: Plain .

- D. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.5 CLEANING AND SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories.
- B. Apply one coat of shop primer to joists and joist accessories.
- C. Shop priming of joists and joist accessories is specified in

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written instructions, and requirements in this Section.
 - 1. Before installation, splice joists delivered to Project site in more than one piece.
 - 2. Space, adjust, and align joists accurately in location before permanently fastening.
 - 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
- C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.2 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Visually inspect field welds according to AWS D1.1/D1.1M.
- C. Visually inspect bolted connections.
- D. Prepare test and inspection reports.

END OF SECTION 05 21 00

SECTION 05 31 00 - STEEL DECKING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Roof deck.
2. Noncomposite form deck.

1.2 ACTION SUBMITTALS

A. Product Data: For the following:

1. Roof deck.
2. Noncomposite form deck.

B. Shop Drawings:

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

1.3 INFORMATIONAL SUBMITTALS

A. Welding certificates.

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

1.4 QUALITY ASSURANCE

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

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

2.2 ROOF DECK

- A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
1. Galvanized-Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 33 , G90 zinc coating.
 2. Deck Profile: Type WR, wide rib .
 3. Profile Depth: As indicated .
 4. Design Uncoated-Steel Thickness: As indicated .

2.3 NONCOMPOSITE FORM DECK

- A. Noncomposite Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with "SDI Specifications and Commentary for Noncomposite Steel Form Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
1. Galvanized-Steel Sheet: ASTM A653/A653M, Structural Steel (SS), Grade 33 , G90 zinc coating.
 2. Profile Depth: As indicated .
 3. Design Uncoated-Steel Thickness: As indicated .

2.4 ACCESSORIES

- A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

- E. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.
- F. Galvanizing Repair Paint: ASTM A780/A780M .
- G. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.
- B. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- C. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- D. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- E. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- F. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.
- G. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck. Space welds not more than 12 inches apart with at least one weld at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and weld .
- H. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- I. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- J. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.

3.2 REPAIR

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field welds will be subject to inspection.
- C. Prepare test and inspection reports.

END OF SECTION 05 31 00

SECTION 05 40 00 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior non-load-bearing wall framing.
2. Interior non-load-bearing wall framing.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site .

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Cold-formed steel framing materials.
2. Exterior non-load-bearing wall framing.
3. Interior non-load-bearing wall framing.
4. Vertical deflection clips.
5. Single deflection track.
6. Double deflection track.
7. Drift clips.
8. Post-installed anchors.
9. Power-actuated anchors.

B. Shop Drawings:

1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

- C. Delegated-Design Submittal: For cold-formed steel framing.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product certificates.

- C. Product test reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E329 for testing indicated.
- B. Product Tests: Mill certificates or data from a qualified independent testing agency.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Cold-Formed Steel Framing Standards: Unless more stringent requirements are indicated, framing shall comply with AISI S100, AISI S200, and the following:
 - 1. Wall Studs: AISI S211.
 - 2. Headers: AISI S212.

2.2 COLD-FORMED STEEL FRAMING MATERIALS

- A. Steel Sheet: ASTM A1003/A1003M, Structural Grade, Type H, metallic coated, of grade and coating designation as follows:
 - 1. Grade: As required by structural performance .
 - 2. Coating: G60 , A60 , AZ50 , or GF30 .
- B. Steel Sheet for Vertical Deflection or Drift Clips: ASTM A653/A653M, structural steel, zinc coated, of grade and coating as follows:
 - 1. Grade: As required by structural performance .
 - 2. Coating: G60 .

2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch .
 - 2. Flange Width: As required by structural performance .
 - 3. Section Properties: As required by structural performance .

- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and matching minimum base-metal thickness of steel studs.
- C. Vertical Deflection Clips: Manufacturer's standard bypassorhead clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure.
- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
- F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.4 INTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0329 inch .
 - 2. Flange Width: As required by structural performance .
 - 3. Section Properties: As required by structural performance .
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and matching minimum base-metal thickness of steel studs.
- C. Vertical Deflection Clips: Manufacturer's standard bypassorhead clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure.
- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
- F. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from ASTM A1003/A1003M, Structural Grade, Type H, metallic coated steel sheet, of same grade and coating designation used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated.

2.6 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A36/A36M, zinc coated by hot-dip process according to ASTM A123/A123M.
- B. Anchor Bolts: ASTM F1554, Grade 36 Grade 55, threaded carbon-steel hex-headed bolts, headless, hooked bolts, headless bolts, with encased end threaded, carbon-steel nuts, and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A153/A153M, Class C .
- C. Post-Installed Anchors: Fastener systems with bolts of same basic metal as fastened metal, if visible, unless otherwise indicated; with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01 ICC-ES AC193 ICC-ES AC58 or ICC-ES AC308 as appropriate for the substrate.
 - 1. Uses: Securing cold-formed steel framing to structure.
 - 2. Type: Torque-controlled expansion anchor Torque-controlled adhesive anchor or adhesive anchor.
 - 3. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
 - 4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.
- D. Power-Actuated Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- E. Mechanical Fasteners: ASTM C1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing; manufacturer's standard elsewhere.

2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A780/A780M .

- B. Cement Grout: Portland cement, ASTM C150/C150M, Type I; and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- C. Nonmetallic, Nonshrink Grout: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C1107/C1107M, and with a fluid consistency and 30-minute working time.
- D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.
- E. Sill Sealer Gasket: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- B. Install sill sealer gasket at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.2 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200, AISI S202, and manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
- D. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- E. Install temporary bracing and supports to secure framing and support loads equal to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.

- G. Install insulation, specified in Section 07 21 00 "Thermal Insulation," in framing-assembly members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- H. Fasten hole-reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.

3.3 INSTALLATION OF EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: As indicated on Drawings .
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
 - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - 3. Connect vertical deflection clips to bypassing or infill studs and anchor to building structure.
 - 4. Connect drift clips to cold-formed steel framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - 1. Install solid blocking at centers indicated on Shop Drawings.

- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.4 INSTALLATION OF INTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure.
- B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 - 1. Stud Spacing: As indicated on Drawings .
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
 - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
 - 3. Connect vertical deflection clips to studs and anchor to building structure.
 - 4. Connect drift clips to cold-formed steel metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - 1. Install solid blocking at centers indicated on Shop Drawings.
- G. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 INSTALLATION TOLERANCES

- A. Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.6 REPAIRS

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A780/A780M and manufacturer's written instructions.

END OF SECTION 05 40 00

SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Steel framing and supports for overhead doors and grilles.
2. Steel framing and supports for countertops.
3. Steel framing and supports for mechanical and electrical equipment.
4. Steel framing and supports for applications where framing and supports are not specified in other Sections.
5. Elevator machine beams, hoist beams,.
6. Steel shapes for supporting elevator door sills.
7. Shelf angles.
8. Metal ladders.
9. Ladder safety cages.
10. Metal ships' ladders.
11. Metal bollards.
12. Metal downspout boots.
13. Loose bearing and leveling plates for applications where they are not specified in other Sections.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.

C. Related Requirements:

1. Section 04 20 00 "Unit Masonry" for installing loose lintels, anchor bolts, and other items built into unit masonry.
2. Section 05 12 00 "Structural Steel Framing" for steel framing, supports, and other steel items attached to the structural-steel framing.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

- B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For the following:

1. Shrinkage-resisting grout.
2. Manufactured metal ladders.
3. Metal ships' ladders.
4. Metal bollards.
5. Metal downspout boots.

- B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1. Steel framing and supports for overhead doors and grilles.
2. Steel framing and supports for countertops.
3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
4. Elevator machine beams, hoist beams,.
5. Steel shapes for supporting elevator door sills.
6. Shelf angles.
7. Metal ladders.
8. Metal ships' ladders.
9. Miscellaneous steel trim including steel angle corner guards and steel edgings.
10. Metal bollards.

- C. Samples for Verification: For each type and finish of extruded nosing.

- D. Delegated-Design Submittal: For ladders, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls, floor slabs, decks, and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design ladders.
- B. Structural Performance of Aluminum Ladders: Ladders shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Stainless Steel Sheet, Strip, and Plate: ASTM A240/A240M or ASTM A666, Type 304.
- D. Stainless Steel Bars and Shapes: ASTM A276/A276M, Type 304.
- E. Steel Tubing: ASTM A500/A500M, cold-formed steel tubing.
- F. Steel Pipe: ASTM A53/A53M, Standard Weight (Schedule 40) unless otherwise indicated.
- G. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.
- H. Aluminum Plate and Sheet: ASTM B209, Alloy 6061-T6.
- I. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.
- J. Aluminum-Alloy Rolled Tread Plate: ASTM B632/B632M, Alloy 6061-T6.
- K. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- C. Stainless Steel Bolts and Nuts: Regular hexagon-head annealed stainless steel bolts, ASTM F593; with hex nuts, ASTM F594; and, where indicated, flat washers; Alloy Group 1.

2.4 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- D. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- E. Concrete: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" for normal-weight, air-entrained concrete with a minimum 28-day compressive strength of 3000 psi.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
1. Fabricate units from slotted channel framing where indicated.
 2. Furnish inserts for units installed after concrete is placed.

2.7 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.
1. Provide mitered and welded units at corners.
 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize shelf angles located in exterior walls.

- D. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.8 METAL LADDERS

A. General:

1. Comply with ANSI A14.3, except for elevator pit ladders.
2. For elevator pit ladders, comply with ASME A17.1/CSA B44.

B. Steel Ladders:

1. Space siderails 16 inches apart unless otherwise indicated.
2. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges.
3. Rungs: 1-inch- diameter, steel bars.
4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
5. Provide platforms as indicated fabricated from welded or pressure-locked steel bar grating, supported by steel angles. Limit openings in gratings to no more than 3/4 inch in least dimension.
6. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
7. Galvanize ladders, including brackets.
8. For elevator pit ladders, comply with ASME A17.1/CSA B44.

C. Aluminum Ladders:

1. Source Limitations: Obtain aluminum ladders from single source from single manufacturer.
2. Space siderails 16 inches apart unless otherwise indicated.
3. Siderails: Continuous extruded-aluminum channels or tubes, not less than 2-1/2 inches deep, 3/4 inch wide, and 1/8 inch thick.
4. Rungs: Extruded-aluminum tubes, not less than 3/4 inch deep and not less than 1/8 inch thick, with ribbed tread surfaces.
5. Fit rungs in centerline of siderails; fasten by welding or with stainless steel fasteners or brackets and aluminum rivets. Top rung of roof hatch ladder shall be level with finished roof. Bottom rung of all ladders shall be no higher than 12" above finished floor.
6. Provide platforms as indicated fabricated from pressure-locked aluminum bar grating or extruded-aluminum plank grating, supported by extruded-aluminum framing. Limit openings in gratings to no more than 1/2 inch in least dimension.
7. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted aluminum brackets.
8. Provide minimum 72-inch- high, hinged security door with padlock hasp at foot of ladder to prevent unauthorized ladder use.

2.9 LADDER SAFETY CAGES

A. General:

1. Fabricate ladder safety cages to comply with ANSI A14.3. Assemble by welding or with stainless steel fasteners.
2. Provide primary hoops at tops and bottoms of cages and spaced not more than 20 feet o.c. Provide secondary intermediate hoops spaced not more than 48 inches o.c. between primary hoops.
3. Fasten assembled safety cage to ladder rails and adjacent construction by welding or with stainless steel fasteners unless otherwise indicated.

B. Aluminum Ladder Safety Cages:

1. Primary Hoops: 1/4-by-4-inch flat bar hoops.
2. Secondary Intermediate Hoops: 1/4-by-2-inch flat bar hoops.
3. Vertical Bars: 1/4-by-2-inch flat bars secured to each hoop.

2.10 METAL SHIPS' LADDERS

A. Provide metal ships' ladders where indicated. Fabricate of open-type construction with channel or plate stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.

1. Treads shall be not less than 5 inches exclusive of nosing or less than 8-1/2 inches including the nosing, and riser height shall be not more than 9-1/2 inches.
2. Fabricate ships' ladders, including railings from steel.
3. Fabricate treads and platforms from welded or pressure-locked steel bar grating. Limit openings in gratings to no more than 1/2 inch in least dimension.
4. Fabricate treads and platforms from rolled-steel floor plate.
5. Comply with applicable railing requirements in Section 05 52 13 "Pipe and Tube Railings."

B. Prime exterior steel ships' ladders, including treads, railings, brackets, and fasteners, with zinc-rich primer.

2.11 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.

C. Galvanize and prime exterior miscellaneous steel trim.

2.12 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 80 steel pipe.
 - 1. Cap bollards with 1/4-inch- thick, steel plate with domed top.
- B. Fabricate sleeves for bollard anchorage from steel or stainless steel pipe with 1/4-inch- thick, steel or stainless steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches deep and 3/4 inch larger than OD of bollard.
- C. Prime steel bollards with zinc-rich primer.

2.13 METAL DOWNSPOUT BOOTS

- A. Manufacturers: Subject to compliance with requirements, provide products from one of the following:
 - 1. Barry Pattern & Foundry
 - 2. Hy-Tech Products, Inc.
 - 3. J.R. Hoe
 - 4. Watts
 - 5. Zurn Engineered Water Solutions
- B. Source Limitations: Obtain downspout boots from single source from single manufacturer.
- C. Provide downspout boots made from cast iron in heights indicated with inlets of size and shape to suit downspouts. Provide units with flanges and holes for countersunk anchor bolts.
 - 1. Outlet: Vertical, to discharge into pipe.
- D. Prime cast-iron downspout boots with zinc-rich primer.

2.14 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span, but not less than 8 inches unless otherwise indicated.
- C. Galvanize and prime loose steel lintels located in exterior walls.
- D. Prime loose steel lintels located in exterior walls with zinc-rich primer.

2.15 GENERAL FINISH REQUIREMENTS

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.16 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning." SSPC-SP 3, "Power Tool Cleaning."
- C. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLATION OF MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.
- B. Anchor supports for overhead doors and overhead grilles securely to, and rigidly brace from, building structure.

3.3 INSTALLATION OF METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.
 - 1. Do not fill removable bollards with concrete.

3.4 REPAIRS

- A. Touchup Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A780/A780M.

END OF SECTION 05 50 00

SECTION 05 51 13 - METAL PAN STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Preassembled steel stairs with concrete-filled o treads.

- B. Related Requirements:

- 1. Section 09 66 23 "Resinous Matrix Terrazzo Flooring" for precast terrazzo treads.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.

- B. Coordinate installation of anchorages for metal stairs.

- 1. 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.
 - 2. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For metal pan stairs and the following:

- 1. Abrasive nosings.
 - 2. Shop primer products.
 - 3. Precast terrazzo treads.

- B. Shop Drawings:

- 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
 - 3. Include plan at each level.

4. Indicate locations of anchors, weld plates, and blocking for attachment of wall-mounted handrails.
5. Indicate profile and dimensions of precast terrazzo treads.

- C. Samples for Verification: For each type and finish of nosing and precast terrazzo tread.
- D. Delegated-Design Submittal: For stairs, precast terrazzo treads,, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the State in which Project is located.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification.
 1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers.
 2. Protect steel members and packaged materials from corrosion and deterioration.
 3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.
 - a. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS**2.1 PERFORMANCE REQUIREMENTS**

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design stairs, precast terrazzo treads,, including attachment to building construction.
- B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform Load: 100 lbf/sq. ft..
 - 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in..
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.
 - 4. Stair Framing: Capable of withstanding stresses resulting from railing and guard loads in addition to loads specified above.
 - 5. Limit deflection of treads, platforms, and framing members to L/360 or 1/4 inch, whichever is less.
- C. Seismic Performance of Stairs: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

2.2 METALS

- A. Metal Surfaces: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- C. Uncoated, Cold-Rolled Steel Sheet: ASTM A1008/A1008M, either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.
- D. Uncoated, Hot-Rolled Steel Sheet: ASTM A1011/A1011M, either commercial steel, Type B, or structural steel, Grade 30, unless another grade is required by design loads.

2.3 ABRASIVE NOSINGS

- A. Cast-Metal Units: Cast bronze, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - 1. Configuration: Cross-hatched units, 3 inches wide without lip.
- B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

- C. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

2.4 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls.
1. Select fasteners for type, grade, and class required.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- C. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
- D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.

2.5 MISCELLANEOUS MATERIALS

- A. Welding Electrodes: Comply with AWS requirements.
- B. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- D. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout; recommended by manufacturer for interior use; noncorrosive and nonstaining; mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
1. Join components by welding unless otherwise indicated.

2. Use connections that maintain structural value of joined pieces.
- B. Assemble stairs in shop to greatest extent possible.
1. Disassemble units only as necessary for shipping and handling limitations.
 2. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately.
1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
 2. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections to comply with the following:
1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. Weld exposed corners and seams continuously unless otherwise indicated.
 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 - No evidence of welded joint.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.
1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
 2. Locate joints where least conspicuous.
 3. Fabricate joints that will be exposed to weather in a manner to exclude water.
 4. Provide weep holes where water may accumulate internally.

2.7 FABRICATION OF STEEL-FRAMED STAIRS

- A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Commercial Class for egress stair and Architectural Class for monumental stair, unless more stringent requirements are indicated.
- B. Stair Framing:
1. Fabricate stringers of steel plates or steel channels.
 - a. Stringer Size: As required to comply with "Performance Requirements" Article.
 - b. Provide closures for exposed ends of channel and rectangular tube stringers.

- c. Finish: Shop primed, field painted.
 2. Construct platforms of steel plate or channel headers and miscellaneous framing members as required to comply with "Performance Requirements" Article.
 - a. Provide closures for exposed ends of channel and rectangular tube framing.
 - b. Finish: Shop primed, field painted.
 3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
 4. Where masonry walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
- C. Metal Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements, but not less than 0.067 inch.
1. Fabricate treads and landing subplatforms of exterior stairs so finished walking surfaces slope to drain.
 2. Steel Sheet: Uncoated, cold -rolled steel sheet.
 3. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
 4. Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
 5. At Contractor's option, provide stair assemblies with metal pan subtreads filled with reinforced concrete during fabrication.

2.8 FINISHES

- A. Finish metal stairs after assembly.
- B. Preparation for Shop Priming: Prepare uncoated, ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."
- C. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF METAL PAN STAIRS

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.
 - 1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
 - 1. Grouted Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates.
 - a. Clean bottom surface of plates.
 - b. Set plates for structural members on wedges, shims, or setting nuts.
 - c. Tighten anchor bolts after supported members have been positioned and plumbed.
 - d. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - e. Promptly pack grout solidly between bearing surfaces and plates so no voids remain.
 - 1) Neatly finish exposed surfaces; protect grout and allow to cure.
 - 2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints.
 - 1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
 - 2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
 - 3. Comply with requirements for welding in "Fabrication, General" Article.
- F. Place and finish concrete fill for treads and platforms to comply with Section 03 30 00 "Cast-in-Place Concrete."
- G. Install precast terrazzo treads according to manufacturer's written instructions.

3.3 REPAIR

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

END OF SECTION 05 51 13

SECTION 05 52 13 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Aluminum railings.

- B. Related Requirements:

- 1. Section 05 73 00 "Decorative Metal Railings" for ornamental railings fabricated from pipes and tubes and guard-infill metals.

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data:

- 1. Manufacturer's product lines of mechanically connected railings.
 - 2. Fasteners.
 - 3. Post-installed anchors.
 - 4. Handrail brackets.
 - 5. Nonshrink, nonmetallic grout.
 - 6. Metal finishes.

- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

- C. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters, including finish.
 2. Fittings and brackets.
 3. Assembled Sample of railing system, made from full-size components, including top rail, post, handrail, and infill. Sample need not be full height.
 - a. Show method of connecting and finishing members at intersections.
- D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For delegated-design professional engineer.
- B. Welding certificates.
- C. Mill Certificates: Signed by manufacturers of stainless steel products, certifying that products furnished comply with requirements.
- D. Research Reports: For post-installed anchors, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces of railings from damage by applying a strippable, temporary protective covering before shipping.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design railings, including attachment to building construction.

- B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. applied in any direction.
 - b. Concentrated load of 200 lbf applied in any direction.
 - c. Uniform and concentrated loads need not be assumed to act concurrently.
 2. Infill of Guards:
 - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
 - b. Infill load and other loads need not be assumed to act concurrently.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
1. Provide type of bracket with flange tapped for concealed anchorage to threaded hanger bolt and that provides 2-1/4-inch clearance from inside face of handrail to finished wall surface.

2.3 ALUMINUM RAILINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Julius Blum & Co. Inc.
 2. Superior Aluminum Products, Inc.
 3. Tubular Specialties Manufacturing, Inc.
 4. Wagner Companies
- B. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- C. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

- D. Extruded Bars and Tubing: ASTM B221, Alloy 6063-T5/T52.
- E. Extruded Structural Pipe: ASTM B429/B429M, Alloy 6063-T6.
 - 1. Provide Standard Weight (Schedule 40) pipe unless otherwise indicated.
- F. Drawn Seamless Tubing: ASTM B210/B210M, Alloy 6063-T832.
- G. Plate and Sheet: ASTM B209, Alloy 6061-T6.
- H. Die and Hand Forgings: ASTM B247, Alloy 6061-T6.
- I. Castings: ASTM B26/B26M, Alloy A356.0-T6.

2.4 FASTENERS

- A. Fastener Materials:
 - 1. Ungalvanized-Steel Railing Components: Plated steel fasteners complying with ASTM F1941, Class Fe/Zn 5 for zinc coating.
 - 2. Aluminum Railing Components: Type 304 stainless steel fasteners.
 - 3. Finish exposed fasteners to match appearance, including color and texture, of railings.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction and capable of withstanding design loads.
- C. Fasteners for Interconnecting Railing Components:
 - 1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
 - 2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
 - 3. Provide Phillips flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, according to an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.
 - 1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless steel bolts, ASTM F593, and nuts, ASTM F594.

2.5 MISCELLANEOUS MATERIALS

- A. Handrail Brackets: Cast aluminum, center of handrail 3 inches from face of railing or wall.
- B. Welding Rods and Bare Electrodes: Select in accordance with AWS specifications for metal alloy welded.
 - 1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- C. Bituminous Paint: Cold-applied asphalt emulsion, complying with ASTM D1187/D1187M.
- D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout, complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

2.6 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.
 - 1. Clearly mark units for reassembly and coordinated installation.
 - 2. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately.
 - 1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
 - 2. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that are exposed to weather in a manner that excludes water.
 - 1. Provide weep holes where water may accumulate.
 - 2. Locate weep holes in inconspicuous locations.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove flux immediately.
 4. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint
- I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
- J. Form changes in direction as follows:
1. By flush bends or by inserting prefabricated flush-elbow fittings.
- K. Bend members in jigs to produce uniform curvature for each configuration required. Maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- L. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.
- M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.
- O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work.
1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
 2. Coordinate anchorage devices with supporting structure.

2.7 ALUMINUM FINISHES

- A. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- B. Clear Anodic Finish: AAMA 611, AA-M12C22A41.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements are clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.2 INSTALLATION, GENERAL

- A. Perform cutting, drilling, and fitting required for installing railings.
 - 1. Fit exposed connections together to form tight, hairline joints.
 - 2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
 - 3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
 - 4. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 5. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 6. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.
 - 1. Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article, whether welding is performed in the shop or in the field.
- B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve, extending 2 inches beyond joint on either side; fasten internal sleeve securely to one side; and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

- A. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Cover anchorage joint with flange of same metal as post, attached to post with setscrews.
- C. Anchor posts to metal surfaces with flanges, angle type, or floor type, as required by conditions, connected to posts and to metal supporting members as follows:
 - 1. For steel railings, weld flanges to post and bolt to metal supporting surfaces.
 - 2. For aluminum railings, attach posts as indicated, using fittings designed and engineered for this purpose.

3.5 ATTACHING RAILINGS

- A. Anchor railing ends to concrete and masonry with flanges connected to railing ends and anchored to wall construction with anchors and bolts.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and welded to railing ends or connected to railing ends, using nonwelded connections.
- C. Attach handrails to walls with wall brackets, except where end flanges are used. Provide brackets with 2 1/4 inch clearance from inside face of handrail and finished wall surface.
 - 1. Use type of bracket with predrilled hole for exposed bolt anchorage.
 - 2. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- D. Secure wall brackets and railing end flanges to building construction as follows:
 - 1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - 2. For hollow masonry anchorage, use toggle bolts.
 - 3. For steel-framed partitions, fasten brackets directly to steel framing or concealed steel reinforcements, using self-tapping screws of size and type required to support structural loads .

3.6 REPAIR

- A. Touchup Painting:
 - 1. Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

- a. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.

3.7 CLEANING

- A. Clean aluminum by washing thoroughly with clean water and soap and rinsing with clean water.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780/A780M.

3.8 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Material Completion.
- B. Restore finishes damaged during installation and construction period, so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 52 13

SECTION 06 10 53 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Wood blocking and nailers.
2. Wood sleepers.
3. Plywood backing panels.

B. Related Requirements:

1. Section 06 16 00 "Sheathing" for sheathing, subflooring, and underlayment.

1.3 DEFINITIONS

- A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater size but less than 5 inches nominal size in least dimension.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D5664.

4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
 3. Dress lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal thickness unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 2. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- D. Application: Treat all miscellaneous carpentry unless otherwise indicated.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
1. Treatment shall not promote corrosion of metal fasteners.
 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D2898. Use for exterior locations and where indicated.
 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 4. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D5664, and design value adjustment factors shall be calculated according to ASTM D6841.

- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.
 - 1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.
- E. For exposed items indicated to receive a stained or natural finish, chemical formulations shall not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat all miscellaneous carpentry unless otherwise indicated.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
- B. Dimension Lumber Items: Construction or No. 2 grade lumber of the following species:
 - 1. Hem-fir (north); NLGA.
 - 2. Mixed southern pine or southern pine; SPIB.
 - 3. Spruce-pine-fir; NLGA.
 - 4. Hem-fir; WCLIB or WWPA.
 - 5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
 - 6. Western woods; WCLIB or WWPA.
 - 7. Northern species; NLGA.
 - 8. Eastern softwoods; NeLMA.
- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

2.5 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: Plywood, DOC PS 1, Exterior, A-C, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
 - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A153/A153M.
- B. Nails, Brads, and Staples: ASTM F1667.
- C. Screws for Fastening to Metal Framing: ASTM C1002, length as recommended by screw manufacturer for material being fastened.

2.7 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing to Concrete or Masonry: Formulation complying with ASTM D3498 that is approved for use indicated by adhesive manufacturer.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry accurately to other construction. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant-treated plywood backing panels with classification marking of testing agency exposed to view.
- C. Do not splice structural members between supports unless otherwise indicated.
- D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- E. Sort and select lumber so that natural characteristics do not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with

function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

- F. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- G. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- H. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 2. ICC-ES evaluation report for fastener.
- I. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 INSTALLATION OF WOOD BLOCKING AND NAILER

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 53

SECTION 06 16 00 - SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Wall sheathing.
- 2. Sheathing joint and penetration treatment.

B. Related Requirements:

- 1. Section 06 10 53 "Miscellaneous Rough Carpentry" for plywood backing panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

- 1. For air-barrier and water-resistant glass-mat gypsum sheathing, include manufacturer's technical data and tested physical and performance properties of products.

1.4 QUALITY ASSURANCE

- A. Mockups: Build mockups to set quality standards for materials and execution.

- 1. Build integrated mockups of exterior wall assembly as indicated on Drawings, incorporating backup wall construction, window, storefront, door frame and sill, ties and other penetrations, and flashing to demonstrate crack and joint treatment and sealing of gaps, terminations, and penetrations of air-barrier sheathing assembly.
 - a. Coordinate construction of mockups to permit inspection and testing of sheathing before external insulation and cladding are installed.
 - b. If Architect determines mockups do not comply with requirements, reconstruct mockups until mockups are approved.
- 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Material Completion.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: As tested according to ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 WALL SHEATHING

- A. Glass-Mat Gypsum Sheathing: ASTM C1177/C1177M.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed GlasRoc Exterior Sheathing
 - b. Georgia-Pacific DensGlass Fireguard Sheathing
 - c. National Gypsum Gold Bond eXP Fire-Shield Sheathing
 - d. USG Corporation Securock Firecode X Glass-Mat Sheathing
 2. Type and Thickness: Type X, 5/8 inch thick.
 3. Size: 48 by 96 inches for vertical installation.

2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
- B. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.
 1. For steel framing from 0.033 to 0.112 inch thick, use screws that comply with ASTM C954.

2.4 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

- A. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in the ICC's International Building Code.
- D. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
 - 1. Fasten gypsum sheathing to cold-formed metal framing with screws.
 - 2. Install panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 - 3. Install panels with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing, but do not cut into facing.

- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each stud.
1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.
 2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.
1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.
 2. For sheathing under stucco cladding, panels may be initially tacked in place with screws if overlying self-furring metal lath is screw-attached through sheathing to studs immediately after sheathing is installed.
- E. Seal sheathing joints according to sheathing manufacturer's written instructions.
1. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel sealant to embed entire face of tape in sealant. Apply sealant to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION 06 16 00

SECTION 06 20 23 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Interior trim, including non-fire-rated interior door frames.
- 2. Interior plywood paneling.

B. Related Requirements:

- 1. Section 09 91 23 "Interior Painting" for priming and backpriming of interior finish carpentry.

1.3 DEFINITIONS

- A. MDF: Medium-density fiberboard.
- B. MDO: Plywood with a medium-density overlay on the face.
- C. PVC: Polyvinyl chloride.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.
- B. Samples for Verification:
 - 1. For each species and cut of lumber and panel products with nonfactory-applied finish, with half of exposed surface finished; 50 sq. in. for lumber and 8 by 10 inches for panels.
 - 2. For each finish system and color of lumber and panel products with factory-applied finish, 50 sq. in. for lumber and 8 by 10 inches for panels.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels flat with spacers between each bundle to provide air circulation.
 - 1. Protect materials from weather by covering with waterproof sheeting, securely anchored.
 - 2. Provide for air circulation around stacks and under coverings.
- B. Deliver interior finish carpentry materials only when environmental conditions comply with requirements specified for installation areas. If interior finish carpentry materials must be stored in other than installation areas, store only where environmental conditions comply with requirements specified for installation areas.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior finish carpentry materials until building is enclosed and weatherproof, wet-work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install finish carpentry materials that are wet, moisture damaged, or mold damaged.
 - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, comply with applicable rules of any rules-writing agency certified by the American Lumber Standard Committee's (ALSC) Board of Review. Grade lumber by an agency certified by the ALSC's Board of Review to inspect and grade lumber under the rules indicated.
- B. Softwood Plywood: DOC PS 1.
- C. Hardboard: ANSI A135.4.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC1.
 - 1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 18 percent, respectively.

2. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
3. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
4. Do not use material that is warped or does not comply with requirements for untreated material.
5. Mark lumber with treatment-quality mark of an inspection agency approved by the ALSC's Board of Review.

2.3 INTERIOR TRIM

A. Hardwood Lumber Trim for Transparent Finish (Stain or Clear Finish):

1. Species and Grade: Red oak; NHLA Clear A Finish.
2. Maximum Moisture Content: 9 percent.
3. Finger Jointing: Not allowed.
4. Gluing for Width: Not allowed.
5. Veneered Material: Not allowed.
6. Face Surface: Surfaced (smooth).
7. Matching: Selected for compatible grain and color.

B. Lumber Trim for Opaque Finish (Painted Finish):

1. Species and Grade:
 - a. Northern poplar; NHLA A Finish.
2. Maximum Moisture Content for Hardwoods: 9 percent.
3. Finger Jointing: Not allowed.
4. Face Surface: Surfaced (smooth).

2.4 PANELING

A. Hardwood Veneer Plywood Paneling: Manufacturer's stock hardwood plywood panels complying with HPVA HP-1.

1. Face Veneer Species and Cut: Rotary-cut white birch.
2. Backing Veneer Species: Any hardwood compatible with face species.
3. Construction: Veneer core.
4. Thickness: 1/4 inch and 3/4 inch.
5. Glue Bond: Type II (interior).
6. Finish: Polished sanded.

2.5 MISCELLANEOUS MATERIALS

- A. Fasteners for Interior Finish Carpentry: Nails, screws, and other anchoring devices of type, size, material, and finish required for application indicated to provide secure attachment, concealed where possible.

2.6 FABRICATION

- A. Back out or kerf backs of the following members, except those with ends exposed in finished work:
 - 1. Interior standing and running trim, except shoe and crown molds.
 - 2. Wood-board paneling.
- B. Ease edges of lumber less than 1 inch in nominal thickness to 1/16-inch radius and edges of lumber 1 inch or more in nominal thickness to 1/8-inch radius.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine finish carpentry materials before installation. Reject materials that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.
- B. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound; warped; improperly treated or finished; inadequately seasoned; too small to fabricate with proper jointing arrangements; or with defective surfaces, sizes, or patterns.
- B. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Use concealed shims where necessary for alignment.

2. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
3. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
4. Install to tolerance of 1/8 inch in 96 inches for level and plumb. Install adjoining interior finish carpentry with 1/32-inch maximum offset for flush installation and 1/16-inch maximum offset for reveal installation.
5. Coordinate interior finish carpentry with materials and systems in or adjacent to it. Provide cutouts for mechanical and electrical items that penetrate interior finish carpentry.

3.4 INSTALLATION OF STANDING AND RUNNING TRIM

- A. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available.
 1. Do not use pieces less than 24 inches long, except where necessary.
 2. Stagger joints in adjacent and related standing and running trim.
 3. Cope at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
 4. Use scarf joints for end-to-end joints.
 5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
 6. Match color and grain pattern of trim for transparent finish (stain or clear finish) across joints.
 7. Install trim after gypsum-board joint finishing operations are completed.
 8. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
 9. Fasten to prevent movement or warping.
 10. Countersink fastener heads on exposed carpentry work and fill holes.

3.5 INSTALLATION OF PANELING

- A. Plywood Paneling: Select and arrange panels on each wall to minimize noticeable variations in grain character and color between adjacent panels.
 1. Leave 1/4-inch gap to be covered with trim at top, bottom, and openings.
 2. Install with uniform tight joints between panels.
 3. Attach panels to supports with manufacturer's recommended panel adhesive and fasteners.
 4. Space fasteners and adhesive as recommended by panel manufacturer.
 5. Conceal fasteners to greatest practical extent.
 6. Arrange panels with grooves and joints over supports.
 - a. Fasten to supports with nails of type and at spacing recommended by panel manufacturer.
 - b. Use fasteners with prefinished heads matching groove color.

- B. Hardboard Paneling: Install according to manufacturer's written instructions.
1. Leave 1/4-inch gap to be covered with trim at top, bottom, and openings.
 2. Butt adjacent panels with moderate contact.
 3. Use fasteners with prefinished heads matching paneling color.
 4. Wood Stud or Furring Substrate: Install with 1-inch annular-ring shank hardboard nails.
 5. Plaster or Gypsum-Board Substrate: Install with 1-5/8-inch annular-ring shank hardboard nails.
 6. Nailing: Space nails 4 inches o.c. at panel perimeter and 8 inches o.c. at intermediate supports unless otherwise required by manufacturer.
- C. Board Paneling: Install according to manufacturer's written instructions.
1. Arrange in random-width pattern suggested by manufacturer unless boards or planks are of uniform width.
 2. Install in full lengths without end joints.
 3. Stagger end joints in random pattern to uniformly distribute joints on each wall.
 4. Install with uniform end joints with only end-matched (tongue-and-groove) joints within each field of paneling.
 5. Install with uniform end joints. Locate end joints only over furring or blocking.
 6. Select and arrange boards on each wall to minimize noticeable variations in grain character and color between adjacent boards.
 7. Install with uniform tight joints between boards.
 8. Fasten paneling by face nailing, setting nails, and filling over nail heads.
 9. Fasten paneling with trim screws, set below face and filled.
 10. Fasten paneling by blind nailing through tongues.
 11. Fasten paneling with paneling system manufacturer's concealed clips.
 12. Fasten paneling to gypsum wallboard with panel adhesive.

3.6 ADJUSTING

- A. Replace interior finish carpentry that is damaged or does not comply with requirements.
1. Interior finish carpentry may be repaired or refinished if work complies with requirements and shows no evidence of repair or refinishing.
- B. Adjust joinery for uniform appearance.

3.7 CLEANING

- A. Clean interior finish carpentry on exposed and semiexposed surfaces.
- B. Restore damaged or soiled areas and touch up factory-applied finishes if any.

3.8 PROTECTION

- A. Protect installed products from damage from weather and other causes during construction.

- B. Remove and replace finish carpentry materials that are wet, moisture damaged, and mold damaged.
1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 06 20 23

SECTION 06 41 13 - WOOD-VENEER-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Wood cabinets for transparent finish for all casework excluding rooms that get Wood Laboratory Casework.
2. Open shelving (base, upper, and tall instrument storage) for transparent finish.
3. Cabinet hardware and accessories.
4. Wood furring, blocking, shims, and hanging strips for installing architectural cabinets that are not concealed within other construction.
5. Shop finishing.

B. Related Requirements:

1. Section 06 10 53 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets that are concealed within other construction before cabinet installation.
2. Section 12 35 53.19 "Wood Laboratory Casework" for additional rooms that require casework covered in this section (Middle School Science Labs – rooms 2710, 2710.1, 2711, 2711.1, 2714 and 2715).

1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to support loads imposed by installed and fully loaded cabinets.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

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

1. Include data for fire-retardant treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. Shop Drawings: For architectural cabinets.

1. Include plans, elevations, sections, and attachment details.
2. Show locations and sizes of cutouts and holes for items installed in architectural cabinets.

C. Samples for Initial Selection: For each type of exposed finish.

D. Samples for Verification: For the following:

1. Lumber for Transparent Finish: Not less than 5 inches wide by 12 inches long, for each species and cut, finished on one side and one edge.
2. Veneer Leaves: Representative of and selected from flitches to be used for transparent-finished cabinets.
3. Exposed Cabinet Hardware and Accessories: One full-size unit for each type and finish.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

1.7 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1. Manufacturer's Certification: Licensed participant in AWI's Quality Certification Program.

B. Installer Qualifications: Manufacturer of products.

C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Build mockups of typical architectural cabinets as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Material Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cabinets until painting and similar finish operations that might damage architectural cabinets have been completed in installation areas. Store cabinets in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.9 FIELD CONDITIONS

- A. Environmental Limitations with Humidity Control: Do not deliver or install cabinets until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- B. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL CABINET MANUFACTURERS

- A. Source Limitations: Engage a qualified woodworking firm to assume responsibility for production of architectural cabinets with sequence-matched wood veneers transparent-finished wood doors that are required to be of same species as architectural cabinets.

2.2 CABINETS, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the Architectural Woodwork Standards for grades of architectural cabinets indicated for construction, finishes, installation, and other requirements.
 - 1. The Contract Documents contain requirements that are more stringent than the referenced woodwork quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

2.3 WOOD CABINETS FOR TRANSPARENT FINISH

- A. Architectural Woodwork Standards Grade: Custom.
- B. Type of Construction: Face frame.
- C. Door and Drawer-Front Style: Flush overlay.
- D. Wood for Exposed Surfaces:
 - 1. Species: Select white birch.
 - 2. Cut: Quarter cut/quarter sawn.

3. Grain Direction: Vertically for doors and fixed panels, horizontally for drawer fronts.
4. Matching of Veneer Leaves: Book match.
5. Veneer Matching within Room: Provide cabinet veneers in each room or other space from a single flitch with doors, drawer fronts, and other surfaces matched in a sequenced set with continuous match where veneers are interrupted perpendicular to the grain.

E. Semiexposed Surfaces:

1. Surfaces Other Than Drawer Bodies: Same species and cut indicated for exposed surfaces.
2. Drawer Subfronts, Backs, and Sides: Solid-hardwood lumber, same species indicated for exposed surfaces.
3. Drawer Bottoms: Hardwood plywood.

F. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

1. Join subfronts, backs, and sides with.

2.4 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of architectural cabinet and quality grade specified unless otherwise indicated.

1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches wide.

2.5 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 08 71 00 "Door Hardware."

B. Butt Hinges: 2-3/4-inch, five-knuckle steel hinges made from 0.095-inch-thick metal, and as follows:

1. Semiconcealed Hinges for Flush Doors: ANSI/BHMA A156.9, B01361.

C. Back-Mounted Pulls: ANSI/BHMA A156.9, B02011.

D. Wire Pulls: Back mounted, solid metal, 5 inches long, 2-1/2 inches deep, and 5/16 inch diameter.

E. Catches: Magnetic catches, ANSI/BHMA A156.9, B03141.

F. Adjustable Shelf Standards and Supports: ANSI/BHMA A156.9, B04071; with shelf rests, B04081.

G. Shelf Rests: ANSI/BHMA A156.9, B04013; metal.

- H. Drawer Slides: ANSI/BHMA A156.9.
1. Grade 1 and Grade 2: Side mounted and extending under bottom edge of drawer.
 - a. Type: Full extension.
 - b. Material: Epoxy-coated steel with polymer rollers.
 2. Grade 1HD-100 and Grade 1HD-200: Side mounted; full -extension type; zinc-plated-steel, ball-bearing slides.
 3. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
 4. For drawers more than 3 inches high, but not more than 6 inches high and not more than 24 inches wide, provide Grade 1 Grade 1HD-100.
 5. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.
 6. For computer keyboard shelves, provide Grade 1HD-100.
 7. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-100.
- I. Door Locks: ANSI/BHMA A156.11, E07121.
- J. Drawer Locks: ANSI/BHMA A156.11, E07041.
- K. Door and Drawer Silencers: ANSI/BHMA A156.16, L03011.
- L. Grommets for Cable Passage: 1-1/4-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
1. Color: Black.
- M. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with ANSI/BHMA A156.18 for BHMA finish number indicated.
1. Satin Stainless Steel: ANSI/BHMA 630.
- N. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in ANSI/BHMA A156.9.

2.6 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Fire-retardant-treated softwood lumber, kiln-dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

2.7 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Fabricate architectural cabinets to dimensions, profiles, and details indicated. Ease edges and corners to 1/16-inch radius unless otherwise indicated.
- C. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
 - 1. Notify Architect seven days in advance of the dates and times architectural cabinet fabrication will be complete.
 - 2. Trial fit assemblies at manufacturer's shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- D. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

2.8 SHOP FINISHING

- A. General: Finish architectural cabinets at manufacturer's shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural cabinets, as applicable to each unit of work.
- C. Transparent Finish:
 - 1. Architectural Woodwork Standards Grade: Custom.
 - 2. Finish: System – 5 – varnish, conversion.
 - 3. Wash Coat for Closed-Grain Woods: Apply wash-coat sealer to cabinets made from closed-grain wood before staining and finishing.
 - 4. Staining: Match approved sample for color.
 - 5. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
 - 6. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter per ASTM D523.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition cabinets to humidity conditions in installation areas for not less than 72 hours.

3.2 INSTALLATION

- A. Architectural Woodwork Standards Grade: Install cabinets to comply with quality standard grade of item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to extent that it was not completed in the shop.
- C. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with cabinet surface.

- 1. For shop-finished items, use filler matching finish of items being installed.

- D. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.

- 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 - 2. Install cabinets without distortion so doors and drawers fit openings and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
 - 3. Maintain veneer sequence matching of cabinets with transparent finish.
 - 4. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips or No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.

- E. Shop Finishes: Touch up finishing after installation of architectural cabinets. Fill nail holes with matching filler.

- 1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects. Where not possible to repair, replace architectural cabinets. Adjust joinery for uniform appearance.

- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces. Touch up finishes to restore damaged or soiled areas.

END OF SECTION 06 41 13

SECTION 06 64 00 - PLASTIC PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Factory-laminated plastic sheet paneling.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For plastic paneling and trim accessories, in manufacturer's standard sizes.

1.4 QUALITY ASSURANCE

- A. Testing Agency: Acceptable to authorities having jurisdiction.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.

2.2 FACTORY-LAMINATED PLASTIC SHEET PANELING

- A. Factory-Laminated Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D5319, laminated to water-resistant gypsum board.
1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. Construction Specialties, Inc.
 - b. Crane Composites.
 - c. Inpro Architectural Products.
 - d. Koroseal - Commercial Wallcoverings.
 - e. Marlite.
 - f. Nudo Products.
 2. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E84. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 200 or less.
 - b. Smoke-Developed Index: 450 or less.
 3. Glass-Fiber-Reinforced Plastic Panel Nominal Thickness: Not less than 0.09 inch.
 4. Surface Finish: As selected by Architect from manufacturer's full range.
 5. Color: White.
 6. Water-Resistant Gypsum Board: ASTM C1396/C1396M or ASTM C1178/C1178M, 5/8 inch, Type X, with water-resistant core and surfaces.

2.3 ACCESSORIES

- A. Trim Accessories: Manufacturer's standard one-piece vinyl extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
1. Color: Match panels.
- B. Exposed Fasteners: Nylon drive rivets recommended by panel manufacturer.
- C. Concealed Mounting Splines: Continuous, H-shaped aluminum extrusions designed to fit into grooves routed in edges of factory-laminated panels and to be fastened to substrate.
- D. Adhesive: As recommended by plastic paneling manufacturer.
- E. Sealant: Mildew-resistant, single-component, neutral-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 07 92 00 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Remove wallpaper, vinyl wall covering, loose or soluble paint, and other materials that might interfere with adhesive bond.
- B. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.
- C. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
- D. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.
- E. Lay out paneling before installing. Locate panel joints so that trimmed panels at corners are not less than 12 inches wide.
 - 1. Mark plumb lines on substrate at trim accessory locations for accurate installation.
 - 2. Locate trim accessories to allow clearance at panel edges according to manufacturer's written instructions.

3.3 INSTALLATION

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive.
- C. Install panels with fasteners. Layout fastener locations and mark on face of panels so that fasteners are accurately aligned.
 - 1. Drill oversized fastener holes in panels and center fasteners in holes.
 - 2. Apply sealant to fastener holes before installing fasteners.
- D. Install factory-laminated panels using concealed mounting splines in panel joints.
- E. Install trim accessories as recommended in writing by panel manufacturer. Do not fasten through panels.

- F. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.
- G. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- H. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.
- I. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION 06 64 00

SECTION 07 17 00 - BENTONITE WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Bentonite waterproofing.
 - 2. Molded-sheet drainage panels.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, and installation instructions.
- B. Shop Drawings: Include installation details for waterproofing, penetrations, and interface with other work.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of waterproofing material.
- B. Sample Warranty: For manufacturer's special warranty.

1.6 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit bentonite waterproofing to be installed according to manufacturer's written instructions and warranty requirements.
 - 1. Do not apply waterproofing materials to surfaces where ice or frost is visible. Do not apply bentonite waterproofing materials in areas with standing water.

2. Do not place bentonite clay products in panel or composite form on damp surfaces unless such practice is approved in writing by manufacturer.

1.7 WARRANTY

- A. Special Warranty: Manufacturer and Installer agree(s) to repair or replace components of bentonite waterproofing system that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 10 years from date of Material Completion.

PART 2 - PRODUCTS

2.1 GEOTEXTILE/BENTONITE SHEETS

- A. Regular Geotextile/Bentonite Sheet: Minimum of 1.0 lb/sq. ft. of bentonite clay granules between two layers of polypropylene geotextile fabric, one woven and one nonwoven, needle punched and heat fused together.

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

- a. Carlisle Coatings & Waterproofing Inc; CCW MiraCLAY.
- b. CETCO, a Minerals Technologies company; Voltex (Basis of Design).
- c. MAPEI Corporation; Mapeproof HW, Mapeproof S

2. Grab Tensile Strength: 95 lbf according to ASTM D4632.
3. Puncture Resistance: 100 lbf according to ASTM D4833.

2.2 PROTECTION COURSE

- A. Protection Course: Protection mat of type and thickness as recommended in writing by waterproofing manufacturer for each Project condition.

1. Adhesive: As recommended in writing by waterproofing manufacturer.

2.3 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced Molded-Sheet Drainage Panels: Composite subsurface drainage panel consisting of studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core, with a polymeric film bonded to the other side; and with a vertical flow rate of 9 to 18 gpm per ft..

2.4 ACCESSORIES

- A. Granular Bentonite: Sodium bentonite clay containing a minimum of 90 percent montmorillonite (hydrated aluminum silicate), with a minimum of 90 percent passing a No. 20 sieve.
- B. Bentonite Mastic: Bentonite compound of trowelable consistency, specifically formulated for application at joints and penetrations.
- C. Bentonite Tubes: Manufacturer's standard 2-inch- diameter, water-soluble tube containing approximately 1.5 lb/ft. of granular bentonite; hermetically sealed; designed specifically for placing on wall footings at line of joint with exterior base of wall.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate preparations and other conditions affecting performance of bentonite waterproofing.
- B. Examine bentonite materials before installation. Reject materials that have been prematurely exposed to moisture.
- C. Verify that substrate is complete and that work that will penetrate waterproofing is complete and rigidly installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions.
- B. Formed Concrete Surfaces: Remove fins and projections. Fill voids, rock pockets, form-tie holes, and other defects with bentonite mastic or cement grout patching material according to manufacturer's written instructions.
- C. Horizontal Concrete Surfaces: Remove debris, standing water, oily substances, mud, and similar substances that could impair the bonding ability of concrete or the effectiveness of waterproofing. Fill voids, cracks greater than 1/8 inch, honeycomb areas, and other defects with bentonite mastic or cement grout patching material according to manufacturer's written instructions.
- D. Excavation Support and Protection System: If water is seeping, use plastic protection sheets or other suitable means to prevent wetting the bentonite waterproofing. Fill minor gaps and spaces 1/8 inch wide or wider with wood, metal, concrete, or other appropriate filling material. Cover

or fill large voids and crevices with cement mortar according to manufacturer's written instructions.

3.3 INSTALLATION, GENERAL

- A. Prepare substrates, voids, cracks, and cavities; and install waterproofing and accessories according to manufacturer's written instructions.
 - 1. Before installing, verify the correct side of waterproofing that shall face substrate surface.
 - 2. Apply granular bentonite around penetrations in horizontal surfaces and changes in plane according to manufacturer's details in preparation for bentonite tubes and mastic.
 - 3. Apply bentonite tubes, bentonite mastic, or both at changes of plane, construction joints in substrate, projections, and penetrations.
 - 4. Prime concrete substrates. Primer may be omitted on concrete surfaces that comply with manufacturer's written requirements for dryness, surface texture, and freedom from imperfections.
- B. Apply bentonite tubes continuously on footing against base of wall to be waterproofed.
- C. Protect waterproofing from damage and wetting before and during subsequent construction operations. Repair punctures, tears, and cuts.
- D. Install protection course before backfilling or placing overburden when recommended in writing by waterproofing manufacturer.

3.4 INSTALLATION OF GEOTEXTILE/BENTONITE SHEETS

- A. Install a continuous layer of waterproofing sheets directly against surface to be waterproofed. Lap ends and edges a minimum of 4 inches on horizontal and vertical substrates unless otherwise indicated. Stagger end joints between sheets a minimum of 24 inches. Fasten seams by stapling to adjacent sheet or nailing to substrate.
- B. Below Structural Slabs-on-Grade: Place waterproofing sheets on compacted substrate with ends and edges lapped and stapled.
 - 1. Install a layer of waterproofing sheets under footings, grade beams, and pile caps; or continue waterproofing through key joints between footings and foundation walls, and extend a minimum of 8 inches up or beyond perimeter slab forms.
- C. Concrete Walls: Starting at bottom of wall, apply waterproofing sheets horizontally against wall. Secure with masonry fasteners spaced according to manufacturer's written instructions. Extend to bottom of footing, grade beam, or wall, and secure.
 - 1. Termination at Grade: Fasten top edge of waterproofing sheets to wall and protect top edge with sheet metal counterflashing. Cover waterproofing with a lapped course of plastic protection sheets if backfilling does not proceed immediately.

3.5 INSTALLATION OF MOLDED-SHEET DRAINAGE PANELS

- A. Place and secure molded-sheet drainage panels according to manufacturer's written instructions. Use adhesives or another method that does not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.
 1. For vertical applications, install protection course before installing drainage panels.

END OF SECTION 07 17 00

SECTION 07 21 00 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Polyisocyanurate foam-plastic board insulation (2").
 - 2. Glass-fiber blanket insulation.
 - 3. Loose-fill insulation.

1.3 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Polyisocyanurate foam-plastic board insulation.
 - 2. Glass-fiber blanket insulation.
 - 3. Loose-fill insulation.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- B. Research Reports: For foam-plastic insulation, from ICC-ES.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.
- B. Protect foam-plastic board insulation as follows:
 - 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
 - 2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.

3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 POLYISOCYANURATE FOAM-PLASTIC BOARD INSULATION

- A. Polyisocyanurate Board Insulation, Foil Faced: ASTM C1289, foil faced, Type I, Class 1 or 2.
 1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 2. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.
- B. Polyisocyanurate Board Insulation, Glass-Fiber-Mat Faced: ASTM C1289, glass-fiber-mat faced, Type II, Class 2.
 1. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 2. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.2 GLASS-FIBER BLANKET INSULATION

- A. Glass-Fiber Blanket Insulation, Unfaced: ASTM C665, Type I; passing ASTM E136 for combustion characteristics.
 1. Flame-Spread Index: Not more than 25 when tested in accordance with ASTM E84.
 2. Smoke-Developed Index: Not more than 50 when tested in accordance with ASTM E84.
 3. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.
- B. Glass-Fiber Blanket Insulation, Polypropylene-Scrim-Kraft Faced: ASTM C665, Type II (nonreflective faced), Class A (faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier).
 1. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.3 LOOSE-FILL INSULATION

- A. Glass-Fiber Loose-Fill Insulation: ASTM C764, Type I for pneumatic application.
 1. Flame-Spread Index: Not more than 5 when tested in accordance with ASTM E84.
 2. Smoke-Developed Index: Not more than 5 when tested in accordance with ASTM E84.

2.4 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.
 - 1. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - 2. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.
- B. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
 - 1. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
 - a. Ceiling plenums.
 - b. Attic spaces.
- C. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 inch between face of insulation and substrate to which anchor is attached.
- D. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.

2.5 ACCESSORIES

- A. Insulation for Miscellaneous Voids:
 - 1. Glass-Fiber Insulation: ASTM C764, Type II, loose fill; with maximum flame-spread and smoke-developed indexes of 5, per ASTM E84.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

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

- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Install insulation with manufacturer's R-value label exposed after insulation is installed.
- D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- E. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. Attics: Install eave ventilation troughs between roof framing members in insulated attic spaces at vented eaves.
 - 5. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft..

3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.
- B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 07 21 00

SECTION 07 24 19 - WATER-DRAINAGE EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. EIFS-clad drainage-wall assemblies that are field applied over substrate.

- B. Related Requirements:

- 1. Section 07 27 26 "Fluid-Applied Membrane Air Barriers" for fluid-applied, synthetic polymer air barriers applied over sheathing behind EIFS-clad wall assemblies.

1.3 DEFINITIONS

- A. Definitions in ASTM E2110 apply to Work of this Section.
- B. EIFS: Exterior insulation and finish system(s).
- C. IBC: International Building Code.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

- A. Product Data: For each EIFS component, trim, and accessory.
- B. Shop Drawings:
 - 1. Include details for EIFS buildouts.
 - 2. Include details for parapet cap flashing.
- C. Samples for Verification: 24-inch-square panels for each type of finish-coat color and texture indicated, prepared using same tools and techniques intended for actual work, including custom trim, each profile, and an aesthetic reveal.

1. Include exposed trim and accessory Samples to verify color selected.
2. Include a typical control joint filled with sealant of color selected, as specified in Section 07 92 00 "Joint Sealants."

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Manufacturer Certificates: Signed by EIFS manufacturer, certifying the following:
 1. EIFS complies with requirements.
 2. Substrates to which EIFS is indicated to be attached are acceptable to EIFS manufacturer.
 3. Accessory products installed with EIFS, including joint sealants, flashing, water-resistive barrier coatings, trim, whether or not furnished by EIFS manufacturer and whether or not specified in this Section, are acceptable to EIFS manufacturer.
- C. Product Test Reports: For each EIFS assembly and component, for tests performed by a qualified testing agency.
- D. Sample Warranty: For manufacturer's special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For EIFS to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An installer who is certified in writing by AWCI International as qualified to install Class PB EIFS using trained workers.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, to set quality standards for materials and execution, and to set quality standards for fabrication and installation.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.

1. Proceed with installation of adhesives or coatings only when ambient temperatures have remained, or are forecast to remain, above 40 deg F (4.4 deg C) for a minimum of 24 hours before, during, and after application. Do not apply EIFS adhesives or coatings during rainfall.

1.11 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair or replace components of EIFS-clad drainage-wall assemblies that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Bond integrity and weathertightness.
 - b. Deterioration of EIFS finishes and other EIFS materials beyond normal weathering.
 2. Warranty coverage includes the following components of EIFS-clad drainage-wall assemblies:
 - a. EIFS finish, including base coats, finish coats, and reinforcing mesh.
 - b. Insulation installed as part of EIFS including foam buildouts.
 - c. Insulation adhesive and mechanical fasteners.
 - d. EIFS accessories, including trim components and flashing.
 - e. Water-resistive barrier coatings.
 - f. EIFS drainage components.
 3. Warranty Period: 10 years from date of Material Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide one of the following:
 1. Sto Corp.; StoTherm ci Essence (basis-of-design)
 2. BASF Senergy Wall Systems
 3. Dryvit Systems Inc.
 4. Parex Premier Continuous Insulation System
- B. Source Limitations: Obtain EIFS from single source from single EIFS manufacturer and from sources approved by EIFS manufacturer as compatible with EIFS components.

2.2 PERFORMANCE REQUIREMENTS

- A. EIFS Performance: Comply with ASTM E2568 and with the following:

1. Weathertightness: Resistant to uncontrolled water penetration from exterior, with a means to drain water entering EIFS to the exterior.
2. Structural Performance of Assembly and Components:
 - a. Wind Loads: Uniform pressure as indicated on Drawings.

2.3 EIFS MATERIALS

- A. Water-Resistive Barrier Coating: EIFS manufacturer's standard formulation and accessories for use as water-resistive barrier coating; compatible with substrate.
 1. Water-Resistance: Comply with physical and performance criteria of ASTM E2570/E2570M.
- B. Drainage Mat: Three-dimensional, nonwoven, entangled filament, nylon or plastic mat designed to drain incidental moisture by gravity; EIFS manufacturer's standard or product recommended in writing by EIFS manufacturer, with manufacturer's standard corrosion-resistant mechanical fasteners suitable for intended substrate.
- C. Molded, (Expanded) Rigid Cellular Polystyrene Board Insulation: Comply with ASTM E2430/E2430M, unless otherwise noted, and the following:
 1. Flame-Spread and Smoke-Developed Indexes: 25 and 450 or less, respectively, according to ASTM E84.
 2. Dimensions: Provide insulation boards of not more than 24 by 48 inches, with thickness indicated on Drawings.
 3. Channeled Board Insulation: EIFS manufacturer's standard factory-fabricated profile with linear, vertical-drainage channels, slots, or waves on the back side of board.
 4. Foam Buildouts: Provide with profiles and dimensions to create profiles as indicated on Drawings.
- D. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. according to ASTM E2098/E2098M and the following:
 1. Reinforcing Mesh for EIFS, General: Not less than weight required to comply with impact-performance level specified in "Performance Requirements" Article.
- E. Water-Resistant Base Coat: EIFS manufacturer's standard water-resistant formulation complying with the following:
 1. Job-mixed formulation of portland cement complying with ASTM C150/C150M, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
- F. Mechanical Fasteners: EIFS manufacturer's standard corrosion-resistant fasteners, consisting of thermal cap, standard washer and shaft attachments, and fastener indicated below; designed to

resist Project's design loads; capable of pulling fastener head below surface of insulation board; and complying with the following:

1. For attachment to steel studs from 0.033 to 0.112 inch in thickness, provide steel drill screws complying with ASTM C954.
2. For attachment to light-gage steel framing members not less than 0.0179 inch in thickness, provide steel drill screws complying with ASTM C1002.
3. For attachment to masonry and concrete substrates, provide sheathing dowel in form of a plastic wing-tipped fastener with thermal cap, sized to fit insulation thickness indicated and to penetrate substrate to depth required to secure anchorage.

G. Primer: EIFS manufacturer's standard factory-mixed, elastomeric-polymer primer for preparing base-coat surface for application of finish coat.

H. Finish Coat: EIFS manufacturer's standard acrylic-based coating with enhanced mildew resistance complying with the following:

1. Factory-mixed formulation of polymer-emulsion binder, colorfast mineral pigments, and fillers used with stone particles for embedding in finish coat to produce an applied-aggregate finish.
2. Colors: As selected by Design Professional from manufacturer's full range.
3. Textures: Basis-of-design: Limestone, Sto Signature Stone 10.

I. Water: Potable.

J. Trim Accessories: Type as designated or required to suit conditions indicated and to comply with EIFS manufacturer's written instructions; manufactured from UV-stabilized PVC; and complying with ASTM D1784, manufacturer's standard cell class for use intended, and ASTM C1063.

1. Parapet Cap Flashing: Type for both flashing and covering parapet top, with design complying with ASTM C1397.

2.4 MIXING

A. Comply with EIFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials, except as recommended by EIFS manufacturer. Mix materials in clean containers. Use materials within time period specified by EIFS manufacturer or discard.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

- B. Examine roof edges, wall framing, flashings, openings, substrates, and junctures at other construction for suitable conditions where EIFS will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Begin coating application only after surfaces are dry.
 - 2. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Protect contiguous work from moisture deterioration and soiling caused by application of EIFS. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
- B. Protect EIFS, substrates, and wall construction behind them from inclement weather during installation. Prevent penetration of moisture behind drainage plane of EIFS and deterioration of substrates.
- C. Prepare and clean substrates to comply with EIFS manufacturer's written instructions to obtain optimum bond between substrate and adhesive for insulation.
 - 1. Concrete Substrates: Provide clean, dry, neutral-pH substrate for insulation installation. Verify suitability of substrate by performing bond and moisture tests recommended by EIFS manufacturer.

3.3 EIFS INSTALLATION, GENERAL

- A. Comply with ASTM C1397, ASTM E2511, and EIFS manufacturer's written instructions for installation of EIFS as applicable to each type of substrate indicated.

3.4 SUBSTRATE PROTECTION APPLICATION

- A. Water-Resistive Barrier Coating: Apply over sheathing to provide a water-resistive barrier.
 - 1. Tape and seal joints, exposed edges, terminations, and inside and outside corners of sheathing unless otherwise indicated by EIFS manufacturer's written instructions.
- B. Flexible-Membrane Flashing: Install over water-resistive barrier coating, applied and lapped to shed water; seal at openings, penetrations, and terminations. Prime substrates with flashing primer if required and install flashing.

3.5 TRIM INSTALLATION

- A. Trim: Apply trim accessories at perimeter of EIFS, at expansion joints, and elsewhere as indicated. Coordinate with installation of insulation.

1. Parapet Cap Flashing: Use where indicated on Drawings.

3.6 DRAINAGE MAT INSTALLATION

- A. Drainage Mat: Apply wrinkle free, continuously, with edges overlapped and mechanically secured with fasteners over water-resistive barrier coating.

3.7 INSULATION INSTALLATION

- A. Board Insulation: Adhesively and mechanically attach insulation to substrate in compliance with ASTM C1397 and the following:

1. Apply adhesive to insulation by notched-trowel method, with notches oriented vertically to produce drainage channels that remain functional after the insulation is adhered to substrate.
2. Press and slide insulation into place. Apply pressure over entire surface of insulation to accomplish uniform contact, high initial grab, and overall level surface.
3. Mechanically attach insulation to substrate. Install top surface of fastener heads flush with plane of insulation. Install fasteners into or through substrates with the following minimum penetration:
 - a. Steel Framing: 5/16 inch.
 - b. Concrete and Masonry: 1 inch.
4. Apply insulation over substrates in courses with long edges of boards oriented horizontally.
5. Begin first course of insulation from a level base line and work upward.
6. Stagger vertical joints of insulation boards in successive courses to produce running bond pattern. Locate joints, so no piece of insulation is less than 12 inches wide or 6 inches high. Offset joints not less than 6 inches from corners of window and door openings and not less than 4 inches from aesthetic reveals.
 - a. Adhesive Attachment: Offset joints of insulation not less than 6 inches from horizontal and 4 inches from vertical joints in sheathing.
 - b. Mechanical Attachment: Offset joints of insulation from horizontal joints in sheathing.
7. Interlock ends at internal and external corners.
8. Abut insulation tightly at joints within and between each course to produce flush, continuously even surfaces without gaps or raised edges between boards. If gaps greater than 1/16 inch occur, fill with insulation cut to fit gaps exactly; insert insulation without using adhesive or other material.
9. Cut insulation to fit openings, corners, and projections precisely and to produce edges and shapes complying with details indicated.
10. Rasp or sand flush entire surface of insulation to remove irregularities projecting more than 1/32 inch from surface of insulation and to remove yellowed areas due to sun exposure; do not create depressions deeper than 1/16 inch. Prevent airborne dispersal and immediately collect insulation raspings or sandings.

11. Install foam buildouts and attach to structural substrate by adhesive and mechanical fastening.
 12. Interrupt insulation for expansion joints where indicated.
 13. Form joints for sealant application by leaving gaps between adjoining insulation edges and between insulation edges and dissimilar adjoining surfaces. Make gaps wide enough to produce joint widths indicated after encapsulating joint substrates with base coat and reinforcing mesh.
 14. Form joints for sealant application with back-to-back casing beads for joints within EIFS and with perimeter casing beads at dissimilar adjoining surfaces. Make gaps between casing beads and between perimeter casing beads and adjoining surfaces of width indicated.
 15. Before installing insulation and before applying field-applied reinforcing mesh, fully wrap board edges. Cover edges of board and extend encapsulating mesh not less than 2-1/2 inches over front and back face unless otherwise indicated on Drawings.
 16. Treat exposed edges of insulation as follows:
 - a. Except for edges forming substrates of sealant joints, encapsulate with base coat, reinforcing mesh, and finish coat.
 - b. Encapsulate edges forming substrates of sealant joints within EIFS or between EIFS and other work with base coat and reinforcing mesh.
 - c. At edges trimmed by accessories, extend base coat, reinforcing mesh, and finish coat over face leg of accessories.
 17. Coordinate installation of flashing and insulation to produce wall assembly that does not allow water to penetrate behind flashing and water-resistive barrier coating.
- B. Expansion Joints: Install at locations indicated, where required by EIFS manufacturer, and as follows:
1. At expansion joints in substrates behind EIFS.
 2. Where EIFS adjoin dissimilar substrates, materials, and construction, including other EIFS.
 3. At floor lines in multilevel wood-framed construction.
 4. Where wall height or building shape changes.
 5. Where EIFS manufacturer requires joints in long continuous elevations.

3.8 BASE-COAT APPLICATION

- A. Water-Resistant Base Coat: Apply full-thickness coverage to exposed insulation and to exposed surfaces of sloped shapes, window sills, parapets, foam build-outs and to other surfaces indicated on Drawings.
- B. Base Coat: Apply full coverage to exposed insulation and foam build-outs with not less than 1/16-inch dry-coat thickness.
- C. Reinforcing Mesh: Embed reinforcing mesh in wet base coat to produce wrinkle-free installation with mesh continuous at corners, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C1397. Do not lap reinforcing mesh within 8 inches of

corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are invisible.

- D. Double-Layer Reinforcing-Mesh Application: Where indicated or required, apply second base coat and second layer of reinforcing mesh, overlapped not less than 2-1/2 inches or otherwise treated at joints to comply with ASTM C1397 in same manner as first application. Do not apply until first base coat has cured.
- E. Additional Reinforcing Mesh: Apply strip-reinforcing mesh around openings, extending 4 inches beyond perimeter. Apply additional 9-by-12-inch strip-reinforcing mesh diagonally at corners of openings (re-entrant corners). Apply 8-inch- wide, strip-reinforcing mesh at both inside and outside corners unless base layer of mesh is lapped not less than 4 inches on each side of corners.
 - 1. At aesthetic reveals, apply strip-reinforcing mesh not less than 8 inches wide.
 - 2. Embed strip-reinforcing mesh in base coat before applying first layer of reinforcing mesh.
- F. Foam Buildouts: Fully embed reinforcing mesh in base coat.
- G. Double Base-Coat Application: Where indicated, apply second base coat in same manner and thickness as first application, except without reinforcing mesh. Do not apply until first base coat has cured.

3.9 FINISH-COAT APPLICATION

- A. Primer: Apply over dry base coat.
- B. Finish Coat: Apply full-thickness coverage over dry primed base coat, maintaining a wet edge at all times for uniform appearance, to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.
 - 1. Embed aggregate in finish coat to produce a uniform applied-aggregate finish of color and texture matching approved sample.
- C. Sealer Coat: Apply over dry finish coat, in number of coats and thickness required by EIFS manufacturer.

3.10 CLEANING AND PROTECTION

- A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.

END OF SECTION 07 24 19

SECTION 07 26 00 - VAPOR RETARDERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Polyethylene vapor retarders under all concrete floor areas.
- B. Related Requirements:
 - 1. Section 03 30 00 "Cast-in-Place Concrete" for under-slab vapor retarders.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Submit drawings fully detailing work to be provided under this section.
- C. Catalog Data: Submit min. of four (4) copies of manufacturer's current standard catalog data that completely describes and generally details products herein specified.
- D. Samples: Provide min. of one (1) sample, size required to be representative of actual product herein specified to be installed, for approval by Design Professional.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

1.5 DELIVERY AND STORAGE

- A. Adequately package and protect materials during shipment.
 - 1. Upon arrival to jobsite, Contractor inspect materials for damage and stains.
 - 2. Remove damaged or permanently stained materials from site and replace at no cost to Owner.
- B. Store materials in dry ventilated areas until installation.

1.6 QUALITY ASSURANCE

- A. Manufacturer's name and identification number listed as means of establishing standard type and quality and not construed as restrictive or proprietary.
- B. Similar products by other reputable manufacturers acceptable provided it is determined, to satisfaction of Design Professional, as equal and comparable in all respects to system specified.
 - 1. Should manufacturers other than listed manufacturers be proposed for use, submit for Architect's approval, complete descriptive data and manufacturer's certificate of conformance of system proposed for use in order that proper comparison be made.
- C. Certificate of Compliance: Submit, as part of Shop Drawings, certification from manufacturer of product or materials furnished herein, stating that product(s) and / or material (s) being furnished comply with technical provisions contained herein.
 - 1. Any and all deviations from technical provisions of specifications shall be specifically noted.
- D. Producer's Statement of Applicability: Submit from manufacturer or other producer, a written-certified statement that producer reviewed proposed application of product on Project.
 - 1. Statement shall state that producer agrees with or does not object to Design Professional's specification and Contractor's selection of product for use in Work.
 - 2. Statement also states that proposed application of product on project is suitable and proper.
- E. Asbestos Certification: Manufacturers of products specified herein shall certify in writing, as part of close-out documents, that products furnished are 100% asbestos free.

PART 2 - PRODUCTS

2.1 POLYETHYLENE VAPOR RETARDERS

- A. Polyethylene Vapor Retarders: ASTM D4397, 10-mil- thick sheet, with maximum permeance rating of 0.1 perm.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Stego Industries, LLC
 - b. Raven Engineered Films
 - c. WRMeadows
 - d. Interplast Group
 - e. Fortiber Building Systems Group

2.2 ACCESSORIES

- A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.
- B. Adhesive for Vapor Retarders: Product recommended by vapor-retarder manufacturer and has demonstrated capability to bond vapor retarders securely to substrates indicated.
- C. Vapor-Retarder Fasteners: Pancake-head, self-tapping steel drill screws; with fender washers.

PART 3 - EXECUTION

3.1 GENERAL

- A. Upon completion of installation of materials specified herein, the contractor shall request that the Design Professional view installation:
 - 1. Provide minimum of 72 hours advanced notice of intent to request field observation.
- B. The Design Professional shall be permitted to view floor slab membranes prior to these materials being concealed.
 - 1. No materials specified herein shall be concealed without the Design Professional having viewed said material.
 - 2. Should the Contractor conceal materials specified herein, prior to the Design Professional viewing said materials, the contractor shall remove finish materials as necessary for Design Professional to ascertain that materials were installed properly.
 - 3. The cost of demolition and replacement of finished materials necessary for viewing of materials shall be at no additional cost to the contract.

3.2 PREPARATION

- A. Clean substrates of substances that are harmful to vapor retarders, including removing projections capable of puncturing vapor retarders.

3.3 FLOOR SLAB MEMBRANE

- A. Seal all penetrations or holes in membrane to ensure continuity of membrane.
 - 1. Penetrations include but are not limited to pipes, keyway stakes, conduit, blackout columns, and rebar.
- B. Installation shall be in accordance with manufacturer's instructions and ASTM E 1643-11.
 - 1. Unroll vapor barrier with the longest dimension parallel with the direction of the pour.
 - 2. Lap vapor barrier over footings and seal to foundation walls.

3. Overlap joints 6" and seal with manufacturers pressure sensitive tape.
4. Seal all penetrations (including pipes) with pipe boot made from manufacturers vapor barrier and tape.
5. Secure to perimeter by turning up total thickness of slab or use manufactures approved tape seal system
6. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities.
7. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6" and taping all four sides with manufacturer's pressure sensitive tape.

3.4 PROTECTION

- A. Protect vapor retarders from damage until concealed by permanent construction.

END OF SECTION 07 26 00

SECTION 07 27 26 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Vapor-permeable, fluid-applied air barriers.

- B. Related Requirements:

- 1. Section 06 16 00 "Sheathing" for wall sheathings and wall sheathing joint-and-penetration treatments.

1.3 DEFINITIONS

- A. ABAA: Air Barrier Association of America.
- B. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- C. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.
- D. Air-Barrier Assembly: The collection of air-barrier materials and accessories applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

- 1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.

1.5 ACTION SUBMITTALS

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

1. Include manufacturer's written instructions for evaluating, preparing, and treating each substrate; technical data; dry film thickness; and tested physical and performance properties of products.

B. Shop Drawings: For air-barrier assemblies.

1. Show locations and extent of air-barrier materials, accessories, and assemblies specific to Project conditions.
2. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
3. Include details of interfaces with other materials that form part of air barrier.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

C. Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.7 QUALITY ASSURANCE

A. Manufacturer's Technical Representative Qualification: An authorized full-time employee representative of manufacturer experienced in the installation and maintenance of the specified system and qualified to determine Installer's compliance with the requirements of this Project.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1. Include copy of Installer's ABAA license and verification of manufacturer's training of installers and supervisors on Project.

C. Installer Limitations: Each type of air barrier system material, fluid-applied and sheet membrane shall be installed by a single installation firm.

D. All associated products used in conjunction with air barrier membranes and forming an integral part of the waterproofing system must be furnished and approved by the air barrier manufacturer and covered by the applicable total system warranties.

E. Mockups: Build mockups to set quality standards for materials and execution.

1. Build integrated mockups of exterior wall assembly , 150 sq. ft., incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and

joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.

2. Coordinate construction of mockups to permit inspection and testing of air barrier before external insulation and cladding are installed.
3. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
4. If Design Professional determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Design Professional specifically approves such deviations in writing.
6. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Material Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- B. Protect stored materials from direct sunlight.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended in writing by air-barrier manufacturer.
 1. Protect substrates from environmental conditions that affect air-barrier performance.
 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Air-Barrier Performance: Air-barrier assembly and seals with adjacent construction shall be capable of performing as a continuous air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

- B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft., when tested according to ASTM E2357.
- C. Water Resistance: Material shall resist 21.6 in water for 5 hours before and after aging when tested per ICC-ES 212.
- D. Nail Sealability: Material shall allow no water found on nail shanks, on underside of sheathing and/or between sheathing and product coating when tested per ASTM D 1970.
- E. Flammability: Material shall allow a Flame Spread of less than 25 and Smoke Development of less than 450 when tested per ASTM E 84.
- F. Adhesion: Material shall exhibit a minimum adhesion of 15 psi when tested per ASTM D 4541.
- G. Compatibility: Material shall be compatible with adjacent materials.
- H. UV Stability: Material shall survive a minimum of 6 months UV Exposure during construction.
- I. System Continuity: Material Manufacturer shall provide materials/system, including flashings, for an interface with windows, door and other penetrations that integrate into a compatible and continuous air barrier assembly.

2.3 HIGH-BUILD AIR BARRIERS, VAPOR PERMEABLE

- A. High-Build, Vapor-Permeable Air Barrier: Synthetic polymer membrane with an installed dry film thickness, according to manufacturer's written instructions, of 35 mils or thicker over smooth, void-free substrates.
- B. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - 1. Carlisle Coatings & Waterproofing; Barritech VP.
 - 2. GCP Applied Technologies Inc.; Perm-A-Barrier VPL.
 - 3. Henry Company; [Air-Bloc 17MR][Air-Bloc 31MR].
 - 4. Meadows, W.R.; Air-Shield LMP.
 - 5. Tremco Incorporated; ExoAir 230.
- C. Physical and Performance Properties:
 - 1. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E2178.
 - 2. Vapor Permeance: Minimum 10 perms; ASTM E96/E96M, Desiccant Method, Procedure A.
 - a. Ultimate Elongation: Minimum 2600 percent; ASTM D412, Die C.
 - b. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.4 ACCESSORY MATERIALS

- A. Requirement: Provide primers, transition strips, termination strips, joint reinforcing fabric and strips, joint sealants, counterflashing strips, flashing sheets and metal termination bars, termination mastic, substrate patching materials, adhesives, tapes, foam sealants, lap sealants, and other accessory materials that are recommended in writing by air-barrier manufacturer to produce a complete air-barrier assembly and that are compatible with primary air-barrier material and adjacent construction to which they may seal.
- B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.
- C. Stainless-Steel Sheet: ASTM A240/A240M, Type 304, 0.0250 inch thick, and Series 300 stainless-steel fasteners.
- D. Preformed Silicone Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with a single-component, neutral-curing, Class 100/50 (low-modulus) silicone sealant for bonding extrusions to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 - 2. Verify that substrates have cured and aged for minimum time recommended in writing by air-barrier manufacturer.
 - 3. Verify that substrates are visibly dry and free of moisture.
 - 4. Verify that masonry joints are flush and completely filled with mortar.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, fill, and seal substrate and joints and cracks in substrate according to manufacturer's written instructions and details. Provide clean, dust-free, and dry substrate for air-barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.
- H. Bridge expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.3 ACCESSORIES INSTALLATION

- A. Install accessory materials according to air-barrier manufacturer's written instructions and details to form a seal with adjacent construction and ensure continuity of air and water barrier.
 - 1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
 - 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
 - 3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
 - 4. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
- B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.
- C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch full contact.
 - 1. Transition Strip: Roll firmly to enhance adhesion.

2. Preformed Silicone Extrusion: Set in full bed of silicone sealant applied to walls, frame, and air-barrier material.

- F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.
- G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
- H. Seal top of through-wall flashings to air barrier with an additional 6-inch-wide, transition strip.
- I. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.4 PRIMARY AIR-BARRIER MATERIAL INSTALLATION

- A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges.
 - 1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
 - 2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
 - 3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.
- B. High-Build Air Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply air-barrier material in full contact around protrusions such as masonry ties.
 - 1. Vapor-Permeable, High-Build Air Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, but not less than 35 mils, applied in one or more equal coats.
- C. Do not cover air barrier until it has been tested and inspected by testing agency.
- D. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.5 FIELD QUALITY CONTROL

- A. ABAA Quality Assurance Program: Perform examinations, preparation, installation, testing, and inspections under ABAA's Quality Assurance Program.

- B. Testing Agency: Owner reserves the right to engage a qualified testing agency to perform tests and inspections.
- C. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
 2. Air-barrier dry film thickness.
 3. Continuous structural support of air-barrier system has been provided.
 4. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
 5. Site conditions for application temperature and dryness of substrates have been maintained.
 6. Maximum exposure time of materials to UV deterioration has not been exceeded.
 7. Surfaces have been primed, if applicable.
 8. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
 9. Termination mastic has been applied on cut edges.
 10. Strips and transition strips have been firmly adhered to substrate.
 11. Compatible materials have been used.
 12. Transitions at changes in direction and structural support at gaps have been provided.
 13. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
 14. All penetrations have been sealed.
- D. Air barriers will be considered defective if they do not pass tests and inspections.
1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.
 2. Remove and replace deficient air-barrier components for retesting as specified above.
- E. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

3.6 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
1. Protect air barrier from exposure to UV light and harmful weather exposure as recommended in writing by manufacturer. If exposed to these conditions for longer than recommended, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed materials according to air-barrier manufacturer's written instructions.
 2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended in writing by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION 07 27 26

SECTION 07 41 13.16 - STANDING-SEAM METAL ROOF PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Standing-seam metal roof panels.

B. Related Sections:

- 1. Section 07 42 93 "Soffit Panels" for metal panels used in horizontal soffit applications.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

- 1. Meet with Owner, Design Professional, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.
- 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- 3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
- 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
- 5. Review structural loading limitations of purlins and rafters during and after roofing.
- 6. Review flashings, special details, drainage, penetrations, equipment curbs, and condition of other construction that affect metal panels.
- 7. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
- 8. Review temporary protection requirements for metal panel systems during and after installation.
- 9. Review procedures for repair of metal panels damaged after installation.
- 10. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
 - 1. Metal Panels: 12 inches long by actual panel width. Include clips, fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

- A. Coordinate sizes and locations of roof curbs, equipment supports, and roof penetrations with actual equipment provided.
- B. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Five years from date of Material Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Material Completion.

- C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
1. Warranty Period: 20 years from date of Material Completion.
 2. Dollar Limit: None.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
 3. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- B. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 at the following test-pressure difference:
1. Test-Pressure Difference: 40 lbf/sq. ft..
- C. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E2140.
- D. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for wind-uplift-resistance class indicated.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

- A. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
1. Aluminum Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1637.
- B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and between ribs; designed for sequential installation by mechanically attaching

panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and mechanically seaming panels together.

1. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - a. Loc Seam 360 by American Buildings Company
 - b. SuperLok by MBCI
 - c. Maxima ADV by McElroy Metal
 - d. PAC TITE-LOC PLUS by Peterson, A Carlisle Company
 - e.
2. Aluminum Sheet: Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, structural quality, Grade 50, Coating Class AZ55 (Grade 340, Coating Class AZM165) unpainted Galvalume Plus coating.
 - a. Thickness: 24 gage
 - b. Surface: Smooth, flat finish.
 - c. Exterior Finish: Three-coat fluoropolymer.
 - d. Color: As selected by Design Professional from manufacturer's full range
 - e.
 - f.
3. Clips: Two-piece floating to accommodate thermal movement.
 - a. Material: 0.0250-inch- thick, stainless steel sheet.
4. Joint Type: Mechanically seamed.
5. Panel Coverage: 16 inches.
6. Panel Height: 2.0 inches (non-trapezoidal).

2.3 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Underlayment: Provide self-adhering, cold-applied, sheet underlayment, a minimum of 30 milsthick, consisting of slip-resistant, polyethylene-film top surface laminated to a layer of butyl or SBS-modified asphalt adhesive, with release-paper backing. Provide primer when recommended by underlayment manufacturer.
 1. Thermal Stability: Stable after testing at 240 deg F; ASTM D1970.
 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F; ASTM D1970.
- B. Slip Sheet: Manufacturer's recommended slip sheet, of type required for application.

2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645; cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.

- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch-thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers. Finish flashing and trim with same finish system as adjacent metal panels. Rake trim wider than 8" shall be two-piece.
- D. Gutters: Formed from aluminum, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch-long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches o.c., fabricated from same metal as gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match roof fascia and rake trim.
- E. Downspouts: Formed from aluminum. Fabricate in 10-foot- long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.
- F. Panel Fasteners: Self-tapping screws designed to withstand design loads.
- G. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 2. Joint Sealant: ASTM C920; elastomeric polyurethane sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.5 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.

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- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal panel manufacturer for application, but not less than thickness of metal being secured.

2.6 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Aluminum Panels and Accessories:
1. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 - 1. Examine primary and secondary roof framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal roof panel manufacturer.
 - 2. Examine solid roof sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal roof panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply at locations indicated on Drawings, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.
 - 1. Apply over the entire roof surface.
- B. Slip Sheet: Apply slip sheet over underlayment before installing metal roof panels.
- C. Flashings: Install flashings to cover underlayment to comply with requirements specified in Section 07 62 00 "Sheet Metal Flashing and Trim."

3.4 INSTALLATION OF STANDING SEAM METAL ROOF PANELS

- A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Shim or otherwise plumb substrates receiving metal panels.
 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 3. Install screw fasteners in predrilled holes.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Install flashing and trim as metal panel work proceeds.
 6. Panels shall not be spliced.
 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
 2. Screw Type: Premium 1 piece Screw w/ Neoprene Washer
- C. Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.
- D. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- E. Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports at each panel ridge and with concealed clips at each panel eave and at the spacing and with fasteners as recommended in writing by manufacturer.
1. Install clips to supports with self-tapping fasteners.
 2. Install pressure plates at locations indicated in manufacturer's written installation instructions.
 3. Snap Joint: Nest standing seams and fasten together by interlocking and completely engaging factory-applied sealant.
 4. Seamed Joint: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
 5. Watertight Installation:
 - a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend in writing by manufacturer as needed to make panels watertight.
 - b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.

- c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
- 1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal roof panel manufacturers; or, if not indicated, types recommended by metal roof panel manufacturer.
- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- 1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
 - 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- H. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion. Expansion joints shall occur every 40' max. Exterior lip of gutter should be lower than interior.
- I. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c. in between.
- 1. Provide elbows at base of downspouts to direct water away from building.
 - 2. Connect downspouts to underground drainage system indicated.
- J. Pipe Flashing: Form flashing around pipe penetration and metal roof panels. Fasten and seal to metal roof panels as recommended by manufacturer.
- 3.5 ERECTION TOLERANCES
- A. Installation Tolerances: Shim and align metal panel units within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.
- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 41 13.16

SECTION 07 42 13.13 - FORMED METAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Concealed-fastener, lap-seam metal wall panels.

B. Related Sections:

- 1. Section 07 42 93 "Soffit Panels" for metal panels used in horizontal soffit applications.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

- 1. Meet with Owner, Design Professional, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
- 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- 3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
- 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
- 5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
- 6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
- 7. Review temporary protection requirements for metal panel assembly during and after installation.
- 8. Review of procedures for repair of metal panels damaged after installation.
- 9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:
 - 1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.

- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Two years from date of Material Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Material Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
 3. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- B. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
1. Test-Pressure Difference: 40 lbf/sq. ft..
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

- A. Provide factory-formed metal panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
- B. Flush-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels.
1. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - a. Architectural Metal Systems
 - b. Ceco Building Systems
 - c. Fabral Metal Wall And Roof Systems
 - d. Imetco
 - e. Kingspan
 - f. McElroy Metal
 - g. PAC HWC panel by Peterson, A Carlisle Company
 2. Aluminum Sheet: Coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Thickness: 0.032 inch.

- b. Surface: Smooth, flat finish.
 - c. Exterior Finish: Three-coat fluoropolymer.
 - d. Color: As selected by Design Professional from manufacturer's full range.
3. Panel Coverage: 12 inches.
 4. Panel Height: 1.5 inches.

2.3 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal panels.
 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.4 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Aluminum Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.

3.3 INSTALLATION

- A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 1. Shim or otherwise plumb substrates receiving metal panels.
 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.

3. Install screw fasteners in predrilled holes.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Install flashing and trim as metal panel work proceeds.
 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 7. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
1. Lap ribbed or fluted sheets one full rib. Apply panels and associated items true to line for neat and weathertight enclosure.
 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.
 3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
 4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
 5. Flash and seal panels with weather closures at perimeter of all openings.
- E. Watertight Installation:
1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels; and elsewhere as needed to make panels watertight.
 2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal wall panel installation, including accessories.
- B. Remove and replace metal wall panels where tests and inspections indicate that they do not comply with specified requirements.
- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

3.5 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 42 13.13

SECTION 07 42 13.23 - METAL COMPOSITE MATERIAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes metal composite material wall panels.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Architect, Owner's insurer if applicable, metal composite material panel Installer, metal composite material panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal composite material panels, including installers of doors, windows, and louvers.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review methods and procedures related to metal composite material panel installation, including manufacturer's written instructions.
 - 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
 - 5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal composite material panels.
 - 6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
 - 7. Review temporary protection requirements for metal composite material panel assembly during and after installation.
 - 8. Review procedures for repair of panels damaged after installation.
 - 9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.

B. Shop Drawings:

1. Include fabrication and installation layouts of metal composite material panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details.
2. Accessories: Include details of the flashing, trim and anchorage, at a scale of not less than 1-1/2 inches per 12 inches.

C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Metal Composite Material Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal composite material panel accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal composite material panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Design Professional specifically approves such deviations in writing.
 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Material Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal composite material panels, and other manufactured items so as not to be damaged or deformed. Package metal composite material panels for protection during transportation and handling.
- B. Unload, store, and erect metal composite material panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal composite material panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal composite material panels to ensure dryness, with positive slope for drainage of water. Do not store metal composite material panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal composite material panels during installation.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal composite material panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

- A. Coordinate metal composite material panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal composite material panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Two years from date of Material Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal composite material panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

- a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Material Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal composite material panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E330:
 1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
 3. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- B. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:
 1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- C. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
 1. Test-Pressure Difference: 6.24 lbf/sq. ft..
- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- E. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- F. Fire Propagation Characteristics: Metal composite material wall panel system passes NFPA 285 testing.

2.2 METAL COMPOSITE MATERIAL WALL PANELS

- A. Metal Composite Material Wall Panel Systems: Provide factory-formed and -assembled, metal composite material wall panels fabricated from two metal facings that are bonded to a solid,

extruded thermoplastic core; formed into profile for installation method indicated. Include attachment assembly components, panel stiffeners, and accessories required for weathertight system.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Alucobond
 - b. Alucoil North America
 - c. Alpolic
 - d. Quality Metalcrafts, LLC
 - e. Reynobond
 - f. Vitrabond

B. Aluminum-Faced Composite Wall Panels: Formed with 0.020-inch- thick, coil-coated aluminum sheet facings.

1. Panel Thickness: 0.157 inch.
2. Core: Fire retardant.
3. Exterior Finish: Three-coat fluoropolymer.

a. Color: As selected by Design Professional from manufacturer's full range.

C. Attachment Assembly Components: Formed from material compatible with panel facing.

D. Attachment Assembly: Manufacturer's standard Clip.

2.3 MISCELLANEOUS MATERIALS

A. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal composite material panel system.

B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal composite material panels unless otherwise indicated.

C. Flashing and Trim: Provide flashing and trim formed from same material as metal composite material panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal composite material panels.

D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal composite material panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.

- E. Panel Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal composite material panels and remain weathertight; and as recommended in writing by metal composite material panel manufacturer.

2.4 FABRICATION

- A. General: Fabricate and finish metal composite material panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Fabricate metal composite material panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum Panels and Accessories:

1. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal composite material panel supports, and other conditions affecting performance of the Work.
 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal composite material wall panel manufacturer.
 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal composite material wall panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and assemblies penetrating metal composite material panels to verify actual locations of penetrations relative to seam locations of metal composite material panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal composite material panel manufacturer's written recommendations.

3.3 METAL COMPOSITE MATERIAL PANEL INSTALLATION

- A. General: Install metal composite material panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor metal composite material panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 1. Shim or otherwise plumb substrates receiving metal composite material panels.

2. Flash and seal metal composite material panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal composite material panels are installed.
 3. Install screw fasteners in predrilled holes.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Install flashing and trim as metal composite material panel work proceeds.
 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 7. Align bottoms of metal composite material panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal composite material panel manufacturer.
- D. Attachment Assembly, General: Install attachment assembly required to support metal composite material wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
- E. Clip Installation: Attach panel clips to supports at locations, spacings, and with fasteners recommended by manufacturer. Attach routed-and-turned flanges of wall panels to panel clips with manufacturer's standard fasteners.
1. Seal horizontal and vertical joints between adjacent panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Section 07 92 00 "Joint Sealants."
 2. Seal horizontal and vertical joints between adjacent metal composite material wall panels with manufacturer's standard gaskets.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal composite material panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal composite material panel manufacturer; or, if not indicated, provide types recommended in writing by metal composite material panel manufacturer.

- G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal composite material wall panel units within installed tolerance of 1/4 inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.5 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect completed metal composite material wall panel installation, including accessories.
- B. Metal composite material wall panels will be considered defective if they do not pass test and inspections.
- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports.

3.6 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal composite material panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal composite material panel installation, clean finished surfaces as recommended by metal composite material panel manufacturer. Maintain in a clean condition during construction.
- B. After metal composite material panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal composite material panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 42 13.23

SECTION 07 42 93 - SOFFIT PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Metal soffit panels.
- B. Related Sections:
 - 1. Section 07 42 13.13 "Formed Metal Wall Panels" for lap-seam metal wall panels.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - 2. Accessories: Include details of flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
 - 1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other metal panel accessories.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, tests performed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.9 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of walls, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 2. Warranty Period: Two years from date of Material Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 2. Finish Warranty Period: 20 years from date of Material Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
 3. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METAL SOFFIT PANELS

- A. Provide metal soffit panels designed to be installed by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners in side laps. Include accessories required for weathertight installation.
- B. Metal Soffit Panels: Match profile and material of metal roof panels.
1. Finish: Match finish and color of metal roof panels.
 2. Sealant: Factory applied within interlocking joint.
- C. Flush-Profile Metal Soffit Panels: Solid and perforated (vented) panels formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels.
1. Manufacturers: Subject to compliance with requirements, provide one of the following:
 - a. Architectural Metal Systems
 - b. Ceco Building Systems
 - c. Faberal Metal Wall And Roof Systems
 - d. Imetco Series 300
 - e. Kingspan
 - f. McElroy Metal
 - g. Construction Metal Products
 - h. The Garland Company
 - i. PAC-CLAD by Peterson, A Carlisle Company
 2. Material: Same material, finish, and color as metal roof panels.
 3. Aluminum Sheet: Coil-coated sheet, ASTM B209, alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Thickness: 0.032 inch.
 - b. Surface: Smooth, flat finish.
 - c. Exterior Finish: Three-coat fluoropolymer.
 - d. Color: As selected by Design Professional from manufacturer's full range.
 4. Panel Coverage: 12 inches.
 5. Panel Height: 1.0 inch.
 6. Provide vented panel every fifth panel, as indicated on Drawings.
- D. Miscellaneous Metal Subframing and Furring: ASTM C645, cold-formed, metallic-coated steel sheet, ASTM A653/A653M, G90 coating designation or ASTM A792/A792M, Class AZ50 aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- E. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.

1. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- thick, flexible closure strips; cut or premolded to match metal panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- F. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Finish flashing and trim with same finish system as adjacent metal panels.
- G. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- H. Panel Sealants: Provide sealant types recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311.

2.3 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

4. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal soffit panel manufacturer for application but not less than thickness of metal being secured.

2.4 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Aluminum Panels and Accessories:
 1. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions for seacoast and severe environments.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 1. Examine framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal panel manufacturer.
 2. Examine sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal panel manufacturer.
 - a. Verify that air- or water-resistive barriers been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C754 and metal panel manufacturer's written recommendations.
 - 1. Soffit Framing: Wire tie or clip furring channels to supports, as required to comply with requirements for assemblies indicated.

3.3 INSTALLATION

- A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 1. Shim or otherwise plumb substrates receiving metal panels.
 - 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal panel work proceeds.
 - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 7. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
 - 1. Aluminum Panels: Use aluminum or stainless steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.
- D. Lap-Seam Metal Panels: Fasten metal panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.
 - 1. Apply panels and associated items true to line for neat and weathertight enclosure.
 - 2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal panels.

3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.

E. Watertight Installation:

1. Apply a continuous ribbon of sealant or tape to seal lapped joints of metal panels, using sealant or tape as recommend by manufacturer on side laps of nesting-type panels and elsewhere as needed to make panels watertight.
2. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
3. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.

F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

G. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling, and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.4 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- B. After metal panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.

- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 42 93

SECTION 07 46 46 - FIBER-CEMENT SIDING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes fiber-cement trim.

1.3 COORDINATION

- A. Coordinate siding installation with flashings and other adjoining construction to ensure proper sequencing.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For each type, color, texture, and pattern required.
 - 1. 12-inch- long-by-actual-width Sample of siding.
 - 2. 12-inch- long-by-actual-width Sample of soffit.

1.5 INFORMATIONAL SUBMITTALS

- A. Research/Evaluation Reports: For each type of fiber-cement siding required, from ICC-ES.
- B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of product, including related accessories, to include in maintenance manuals.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with labels intact until time of use.

- B. Store materials on elevated platforms, under cover, and in a dry location.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace products that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including cracking and deforming.
 - b. Deterioration of materials beyond normal weathering.
 - 2. Warranty Period: 25 years from date of Material Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain products, including related accessories, from single source from single manufacturer.

2.2 FIBER-CEMENT TRIM

- A. General: ASTM C1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E136; with a flame-spread index of 25 or less when tested according to ASTM E84.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Allura Plycem
 - b. American Fiber Cement Corporation
 - c. GAF WeatherSide
 - d. James Hardie
 - e. Nichiha USA, Inc.
 - B. Labeling: Provide fiber-cement siding that is tested and labeled according to ASTM C1186 by a qualified testing agency acceptable to authorities having jurisdiction.
 - C. Nominal Thickness: Not less than 3/4 inch
 - D. Factory Priming: Manufacturer's standard acrylic primer.

2.3 ACCESSORIES

- A. Siding Accessories, General: Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.
 - 1. Provide accessories matching color and texture of adjacent siding unless otherwise indicated.
- B. Decorative Accessories: Provide the following fiber-cement decorative accessories as indicated:
 - 1. Moldings and trim.
- C. Flashing: Provide stainless-steel flashing complying with Section 07 62 00 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.
- D. Fasteners:
 - 1. For fastening to metal, use ribbed bugle-head screws of sufficient length to penetrate a minimum of 1/4 inch, or three screw-threads, into substrate.
 - 2. For fastening fiber cement, use stainless-steel fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of fiber-cement siding and related accessories.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrates of projections and substances detrimental to application.

3.3 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions applicable to products and applications indicated unless more stringent requirements apply.
 - 1. Do not install damaged components.
 - 2. Install fasteners no more than 24 inches o.c.
- B. Install joint sealants as specified in Section 07 92 00 "Joint Sealants" and to produce a weathertight installation.

3.4 ADJUSTING AND CLEANING

- A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.
- B. Clean finished surfaces according to manufacturer's written instructions and maintain in a clean condition during construction.

END OF SECTION 07 46 46

SECTION 07 54 19 - POLYVINYL-CHLORIDE (PVC) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Adhered polyvinyl chloride (PVC) roofing system.
2. Mechanically fastened, polyvinyl chloride (PVC) roofing system.
3. Walkways.

B. Related Requirements:

1. Section 06 10 53 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.
2. Section 07 71 00 "Roof Specialties" for premanufactured copings and roof edge flashings.

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to work of this Section.

1.4 PREINSTALLATION MEETINGS

- A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.

1. Meet with Owner, Design Professional, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

4. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

B. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Design Professional, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, air barrier Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For insulation and roof system component fasteners, include copy of SPRI's Directory of Roof Assemblies listing.

B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:

1. Base flashings and membrane terminations.
2. Flashing details at penetrations.
3. Tapered insulation thickness and slopes.
4. Roof plan showing orientation of steel roof deck and orientation of roof membrane, fastening spacings, and patterns for mechanically fastened roofing system.
5. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

6. Tie-in with air barrier.

C. Samples for Verification: For the following products:

1. Roof membrane and flashing, of color required.
2. Walkway pads or rolls, of color required.

D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements. Manufacturer shall provide stamped certification of ES-1 approved edge trim.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Manufacturer Certificates:

1. Performance Requirement Certificate: Signed by roof membrane manufacturer, certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - a. Submit evidence of compliance with performance requirements. The statement shall be on company letterhead from the Director of Technical Services of the roof membrane manufacturer company.
 - b. The statement shall state the manufacturer has received a complete set of project drawings and specifications.
 - c. The statement shall state the producer agrees with or does not object to the Design Professional's specification and Contractor's selection of product for use in the Work.
 - d. The statement shall state the proposed application of the product on the project is suitable and proper.
2. Any and all deviations from the technical provisions of the specifications shall be specifically noted. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

C. Product Test Reports: For roof membrane and insulation, tests performed by independent qualified testing agency indicating compliance with specified requirements.

D. Evaluation Reports: For components of roofing system, from ICC-ES.

E. Field Test Reports:

1. Owner will engage a qualified testing agency to perform a fastener pullout test. Provide one test for each 5,000 SF or two per section of roof, whichever is more.

F. Field quality-control reports.

- G. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.
- B. Certified statement from existing roof membrane manufacturer stating that existing roof warranty has not been affected by Work performed under this Section.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is listed in SPRI's Directory of Roof Assemblies for roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.
 - 1. The installer shall submit, as a part of the shop drawings, a letter from the roof membrane manufacturer, attesting to the date that the installer received certification from the manufacturer, and the dates that the installer attended school prior to attaining full certification. Failure to submit this information will subject the submittal to rejection.
 - 2. Installer must be listed by the Manufacturer as a Top Tier Installer of their product.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

1.10 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship with no dollar limit within specified warranty period.
1. Special warranty includes roof membrane, base flashings, fasteners, and other components of roofing system.
 2. Warranty Period: 5 years from date of Material Completion.
 3. Warranty for low slope systems: 20-year "No Dollar Limit" material and labor weather tightness warranty to include all penetrations, curbs, internal roof drain hubs (if applicable) and metal flashings identified as an "Edge to Edge" or "System" warranty.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roof membrane, base flashing, fasteners, and walkway products, for the following warranty period:
1. Warranty Period: 20 years from date of Material Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.
- C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:
1. Zone 1 (Roof Area Field): Refer to Structural Drawings for design requirements.
 2. Zone 2 (Roof Area Perimeter): Refer to Structural Drawings for design requirements.
 3. Zone 3 (Roof Area Corners): Refer to Structural Drawings for design requirements.
- D. SPRI's Directory of Roof Assemblies Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part

of a roofing system, and shall be listed in SPRI's Directory of Roof Assemblies for roof assembly identical for that specified for this Project.

1. Wind Uplift Load Capacity: Designed to meet the components & cladding wind pressures as indicated on the Structural drawings.
- E. Energy Performance: Roofing system shall have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.
- F. Exterior Fire-Test Exposure: ASTM E108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.2 POLYVINYL CHLORIDE (PVC) ROOFING

- A. PVC Sheet: ASTM D4434/D4434M, Type III, fabric reinforced.
 1. Manufacturers: Subject to compliance with the specified requirements, provide one of the following:
 - a. Duro-Last EV Roofing Membrane by Duro-Last, Inc.
 - b. JM PVC with DuPont Elvaloy KEE Polymer by Johns Manville
 - c. Sarnafil "G" or "S" Series Membrane by Sika Corporation
 - d. Fure-Flex KEE HP by Carlisle Syntec Systems
 2. Thickness: 60 mils .
 3. Exposed Face Color: White.
- B. Source Limitations: Obtain components for roofing system from roof membrane manufacturer.

2.3 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with other roofing components.
 1. Adhesives and Sealants: Comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as PVC sheet.
- C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.
- D. Roof Vents: As recommended by roof membrane manufacturer.
 1. Size: Not less than 4-inch diameter.

- E. Bonding Adhesive: Manufacturer's standard, water based.
- F. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to substrate, and acceptable to roofing system manufacturer.
- G. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

2.4 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.
 - 1. Size: Approximately 36 by 60 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 3. Verify that minimum curing period recommended by roofing system manufacturer for lightweight insulating concrete roof decks has passed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Perform fastener-pullout tests according to roof system manufacturer's written instructions.

1. Submit test result within 24 hours of performing tests.
 - a. Include manufacturer's requirements for any revision to previously submitted fastener patterns required to achieve specified wind uplift requirements.

3.3 INSTALLATION OF ROOFING, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions, SPRI's Directory of Roof Assemblies listed roof assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at end of workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
- C. Coordinate installation and transition of roofing system component serving as an air barrier with air barrier specified under Section 07 27 26 "Fluid-Applied Membrane Air Barriers."

3.4 INSTALLATION OF COVER BOARDS

- A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction.
 1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 2. At internal roof drains, conform to slope of drain sump.
 - a. Trim cover board so that water flow is unrestricted.
 3. Cut and fit cover board tight to nailers, projections, and penetrations.
- B. Install slip sheet over cover board and immediately beneath roof membrane.

3.5 INSTALLATION OF ADHERED ROOF MEMBRANE

- A. Membrane shall be adhered over lightweight insulating concrete, per the roof membrane Manufacturer's requirements, in areas where the roof deck is to be exposed. Adhere roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.
- C. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- D. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

- E. Bonding Adhesive: Apply to substrate and underside of roof membrane at rate required by manufacturer, and allow to partially dry before installing roof membrane. Do not apply to splice area of roof membrane.
- F. Fabric-Backed Roof Membrane Adhesive: Apply to substrate at rate required by manufacturer, and install fabric-backed roof membrane.
- G. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.
- H. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- I. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roof membrane and sheet flashings to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
 - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- J. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.6 INSTALLATION OF MECHANICALLY FASTENED ROOF MEMBRANE

- A. Mechanically fasten roof membrane over area to receive roofing according to roofing system manufacturer's written instructions.
- B. Unroll roof membrane and allow to relax before installing.
- C. For in-splice attachment, install roof membrane with long dimension perpendicular to steel roof deck flutes.
- D. Start installation of roofing in presence of roofing system manufacturer's technical personnel.
- E. Accurately align roof membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- F. Mechanically fasten or adhere roof membrane securely at terminations, penetrations, and perimeter of roofing.
- G. Apply roof membrane with side laps shingled with slope of roof deck where possible.
- H. In-Seam Attachment: Secure one edge of PVC sheet using fastening plates or metal battens centered within seam, and mechanically fasten PVC sheet to roof deck.
- I. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
 3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.
- J. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with clamping ring.

3.7 INSTALLATION OF BASE FLASHING

- A. Install PVC coated metal flashings and preformed flashing accessories in accordance with membrane roofing system Manufacturer's written instructions.
- B. At parapet walls and similar conditions, provide metal flashing within a minimum of four (4) inch leg horizontal and ten (10) inch vertical or to top of parapet. Fasten along horizontal leg to be covered by roofing membrane.
- C. At curbs flashed with membrane, membrane shall be wrapped over top of curb and self-adhering foam weather stripping shall be installed between membrane and mechanical unit.
- D. Curbs flashed with PVC clad metal shall include a "slip or skirt" flashing to butt firmly against underside of mechanical unit and fasten to inside of curb.
- E. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- F. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.8 INSTALLATION OF WALKWAYS

- A. Flexible Walkways: Install walkway products according to manufacturer's written instructions.
 1. Install flexible walkways at the following locations:
 - a. Walk pads shall be installed on all sides of rooftop equipment requiring maintenance or at points of heavy traffic unless otherwise noted on the drawings.
 - b. As required by roof membrane manufacturer's warranty requirements.
 2. Provide 6-inch clearance between adjoining pads.
 3. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to inspect substrate conditions, surface preparation, roof membrane application, sheet flashings, protection, and drainage components, and to furnish reports to Design Professional.
- B. Roof Inspections: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on start, at 50% completion and at final completion, in presence of Design Professional, and to prepare inspection reports.
- C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.10 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Design Professional and Owner.
- B. Cuts and heavy scratching on membrane surface will be repaired or replaced at Owner's discretion regardless of acceptance of warranty by manufacturer.
- C. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Material Completion and according to warranty requirements.
- D. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

3.11 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 1. Owner: Savannah Chatham County Public School System.
 2. Address: 208 Bull Street, Savannah, Georgia 31401.
 3. Building Name/Type: C20-23 New K-12 Multi-School.
 4. Address: 100 Thomas D. Priscilla Way, Garden City, Georgia 31408.
 5. Area of Work: Insert information.
 6. Acceptance Date: _____.
 7. Warranty Period: Five years.
 8. Expiration Date: _____.

- B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,
- C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.
- D. This Warranty is made subject to the following terms and conditions:
1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:
 - a. lightning;
 - b. fire;
 - c. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
 - d. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
 - e. vapor condensation on bottom of roofing; and
 - f. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.
 2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.
 3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
 4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
 5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
 6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.

- 7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

- 1. Authorized Signature: _____.
- 2. Name: _____.
- 3. Title: _____.

END OF SECTION 07 54 19

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Manufactured reglets with counterflashing.
2. Formed wall sheet metal fabrications.
3. Formed equipment support flashing.

B. Related Requirements:

1. Section 07 71 00 "Roof Specialties" for manufactured copings, roof-edge specialties, roof-edge drainage systems, reglets, and counterflashings.
2. Section 07 72 00 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Review requirements for insurance and certificates if applicable.
4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each of the following

1. Underlayment materials.
2. Elastomeric sealant.
3. Butyl sealant.
4. Epoxy seam sealer.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction from fixed points.
8. Include details of roof-penetration flashing.
9. Include details of edge conditions, including eaves, ridges, valleys, rakes, crickets, flashings, and counterflashings.
10. Include details of special conditions.
11. Include details of connections to adjoining work.
12. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches.

C. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches long and in required profile. Include fasteners and other exposed accessories.
3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.8 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
 - 1. For copings and roof edge flashings that are ANSI/SPRI/FM 4435/ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage.
 - 1. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
 - 2. Protect stored sheet metal flashing and trim from contact with water.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

- A. Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Stainless Steel Sheet: ASTM A240/A240M, Type 304, dead soft, fully annealed; with smooth, flat surface.

1. Finish: ASTM A480/A480M, No. 2B (bright, cold rolled).
 - a. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - b. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1) Run grain of directional finishes with long dimension of each piece.
 - 2) When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

2.3 MISCELLANEOUS MATERIALS

- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.
 - b. Blind Fasteners: High-strength aluminum or stainless steel rivets suitable for metal being fastened.
 - c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
 2. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.
- C. Solder:
 1. For Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

2.4 FABRICATION, GENERAL

- A. Custom fabricate sheet metal flashing and trim to comply with details indicated and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required.
1. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 2. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 3. Verify shapes and dimensions of surfaces to be covered and obtain field measurements for accurate fit before shop fabrication.
 4. Form sheet metal flashing and trim to fit substrates without excessive oil-canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 5. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances:
1. Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
 2. Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal and 1 gauge thicker than anchored accessory or trim material.
- F. Seams:
1. Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 2. Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- G. Do not use graphite pencils to mark metal surfaces.

2.5 WALL SHEET METAL FABRICATIONS

- A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- long, but not exceeding 12-foot- long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches beyond each side of wall openings; and form with 2-inch- high, end dams. Fabricate from the following materials:
1. Stainless Steel: 0.0156 inch thick.
- B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings. Form head and sill flashing with 2-inch- high, end dams. Fabricate from the following materials:
1. Stainless Steel: 0.0156 inch thick.

2.6 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
1. Stainless Steel: 0.0188 inch thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
1. Verify compliance with requirements for installation tolerances of substrates.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install sheet metal flashing and trim to comply with details indicated and recommendations of cited sheet metal standard that apply to installation characteristics required unless otherwise indicated on Drawings.
1. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

2. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder welds and sealant.
 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance.
 5. Install continuous cleats with fasteners spaced not more than 12 inches o.c.
 6. Space individual cleats not more than 12 inches apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 7. Install exposed sheet metal flashing and trim with limited oil-canning, and free of buckling and tool marks.
 8. Do not field cut sheet metal flashing and trim by torch.
 9. Do not use graphite pencils to mark metal surfaces.
- B. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
1. Space movement joints at maximum of 10 feet with no joints within 24 inches of corner or intersection.
 2. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 3. Use lapped expansion joints only where indicated on Drawings.
- C. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- D. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- E. Seal joints as required for watertight construction.
1. Use sealant-filled joints unless otherwise indicated.
 - a. Embed hooked flanges of joint members not less than 1 inch into sealant.
 - b. Form joints to completely conceal sealant.
 - c. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way.
 - d. Adjust setting proportionately for installation at higher ambient temperatures.
 - 1) Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Section 07 92 00 "Joint Sealants."
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.
1. Pretin edges of sheets with solder to width of 1-1/2 inches; however, reduce pretinching where pretinned surface would show in completed Work.
 2. Do not use torches for soldering.
 3. Heat surfaces to receive solder, and flow solder into joint.

- a. Fill joint completely.
 - b. Completely remove flux and spatter from exposed surfaces.
4. Stainless Steel Soldering:
- a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
 - b. Promptly remove acid-flux residue from metal after tinning and soldering.
 - c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

3.3 INSTALLATION OF WALL FLASHINGS

- A. Install sheet metal wall flashing to intercept and exclude penetrating moisture in accordance with cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches beyond wall openings.

3.4 INSTALLATION OF MISCELLANEOUS FLASHING

- A. Equipment Support Flashing:
 1. Coordinate installation of equipment support flashing with installation of roofing and equipment.
 2. Weld or seal flashing with elastomeric sealant to equipment support member.

3.5 INSTALLATION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines indicated on Drawings and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
 1. Seal all tolerances with urethane joint sealant.

3.6 CLEANING

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.

3.7 PROTECTION

- A. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended in writing by sheet metal flashing and trim manufacturer.
- C. Maintain sheet metal flashing and trim in clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures, as determined by Architect.

END OF SECTION 07 62 00

SECTION 07 71 00 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Copings.
2. Roof-edge drainage systems.
3. Reglets and counterflashings.

B. Related Requirements:

1. Section 05 50 00 "Metal Fabrications" for downspout guards and downspout boots.
2. Section 07 41 13.16 "Standing-Seam Metal Roof Panels" for roof-edge drainage-system components provided by metal-roof-panel manufacturer.
3. Section 07 72 00 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.
4. Section 07 92 00 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

C. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Design Professional, Owner's insurer if applicable, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer's representative, Installer, structural-support Installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof specialties.

1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
2. Include details for expansion and contraction; locations of expansion joints, including direction of expansion and contraction.
3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
4. Detail termination points and assemblies, including fixed points.
5. Include details of special conditions.

C. Samples for Verification:

1. Include Samples of each type of roof specialty to verify finish and color selection, in manufacturer's standard sizes.
2. Include copings roof-edge specialties, reglets and counter flashings made from 12-inch lengths of full-size components in specified material, and including fasteners, cover joints, accessories, and attachments.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Product Certificates: For each type of roof specialty.
- C. Product Test Reports: For copings and roof-edge flashings, for tests performed by a qualified testing agency.
- D. Sample Warranty: For manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are FM Approvals listed for specified class.
- B. Source Limitations: Obtain roof specialties approved by manufacturer providing roofing-system warranty specified in Section 07 41 13.16 STANDING-SEAM METAL ROOF PANELS.
- C. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and set quality standards for fabrication and installation.
 1. Build mockup of typical roof edge as shown on Drawings.

2. Build mockup of typical roof edge as part of Integrated Exterior Mockup specified in Section 01 40 00 "Quality Requirements"
3. Build mockup of typical roof edge, including fascia gutter and downspout, approximately Insert dimension long, including supporting construction, seams, attachments, and accessories.
4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Design Professional specifically approves such deviations in writing.
5. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- 6.
7. High performance coping shall be certified by the Manufacturer to meet performance design criteria according to the following test standards:
 - a. ANSI/SPRI ES-1 Test Method RE-3 for Coping: Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems (current edition). The coping system shall be tested simultaneously on horizontal and vertical surfaces and shall exceed horizontal and vertical design wind pressure as calculated in accord with the ANSI/SPRI ES-1 Test RE-3. Use the current edition of ANSI/SPRI ES-1 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems.
 - b. The coping product shall be listed in current Factory Mutual Research Corporation Approval Guide approved for Class FM 1-90.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.
- B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to extent necessary for the period of roof-specialty installation.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTY

- A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 07 41 13.16 "STANDING-SEAM METAL ROOF PANELS."

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
- B. SPRI Wind Design Standard: Manufacture and install copings and roof-edge specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:
 - 1. Design Pressure: As indicated on Drawings.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COPINGS

- A. Metal Copings: Manufactured coping system consisting of metal coping cap in section lengths not exceeding 12 feet, concealed anchorage; with corner units, end cap units, and concealed splice plates with finish matching coping caps. Basis-of-design: Presto-Lock Coping by Johns Manville.
 - 1. Extruded-Aluminum Coping Caps: Extruded aluminum, 0.125 inch thick.
 - a. Finish: Two-coat fluoropolymer.
 - b. Color: As selected by Design Professional from manufacturer's full range.
 - 2. Corners: Factory mitered and continuously welded.
 - 3. Coping-Cap Attachment Method: Snap-on, fabricated from coping-cap material.
 - a. Snap-on Coping Anchor Plates: Concealed, galvanized-steel sheet, 12 inches wide, with integral cleats.
 - b. Roof membrane base flashing shall be installed over top of parapets and roof membrane sheets shall be fully installed prior to installing metal copings.

2.3 ROOF-EDGE DRAINAGE SYSTEMS

- A. Gutters: Manufactured in uniform section lengths not exceeding 12 feet, with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.

1. Aluminum Sheet: 0.040 inch thick.
 2. Gutter Profile: As indicated according to SMACNA's "Architectural Sheet Metal Manual."
 3. Corners: Factory mitered and continuously welded.
 4. Gutter Supports: Straps with finish matching the gutters.
- B. Downspouts: Plain round complete with mitered elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
1. Extruded Aluminum: 0.125 inch thick.
- C. Parapet Scuppers: Manufactured with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.
1. Formed Aluminum: 0.032 inch thick.
- D. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge, and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout, exterior flange trim,.
1. Formed Aluminum: 0.032 inch thick.
 2. Attach collector head to wall below scupper. An overflow outlet shall be provided at each collector head.
- E. Aluminum Finish: Two-coat fluoropolymer.
1. Color: As selected by Design Professional from manufacturer's full range.

2.4 REGLETS AND COUNTERFLASHINGS

- A. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:
1. Formed Aluminum: 0.050 inch thick.
 2. Corners: Factory mitered and continuously welded.
 3. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 4. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.
- B. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:
1. Formed Aluminum: 0.032 inch thick.
- C. Accessories:

1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.
2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

D. Aluminum Finish: Two-coat fluoropolymer.

1. Color: As selected by Design Professional from manufacturer's full range.

2.5 MATERIALS

- A. Aluminum Extrusions: ASTM B221, alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:

2.6 UNDERLAYMENT MATERIALS

- A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

1. Thermal Stability: ASTM D1970/D1970M; stable after testing at 240 deg F.
2. Low-Temperature Flexibility: ASTM D1970/D1970M; passes after testing at minus 20 deg F.

2.7 MISCELLANEOUS MATERIALS

- A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.
2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.

- B. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

- C. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.8 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Aluminum Extrusion Finishes:
 - 1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer: AAMA 2604. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.
- C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF UNDERLAYMENT

- A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.
 - 1. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.

3.3 INSTALLATION, GENERAL

- A. Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder,

protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. Space movement joints at a maximum of 12 feet with no joints within 18 inches of corners or intersections unless otherwise indicated on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches; however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.4 INSTALLATION OF COPINGS

A. Installing contractor shall check as-built conditions and verify manufacturer's coping details for accuracy to fit the wall assembly prior to fabrication. The installer shall comply with manufacturer's installation guide when setting copings.

B. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

- C. Anchor copings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.
 - 1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's required spacing that meets performance requirements.

3.5 INSTALLATION OF ROOF-EDGE DRAINAGE-SYSTEM

- A. Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.
- B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 24 inches apart. Attach ends with rivets and solder to make watertight. Slope to downspouts.
 - 1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet apart. Install expansion-joint caps.
- C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.
 - 1. Connect downspouts to underground drainage system indicated.
- D. Parapet Scuppers: Install scuppers through parapet where indicated. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
 - 1. Anchor scupper closure trim flange to exterior wall and seal or solder to scupper.
 - 2. Loosely lock front edge of scupper with conductor head.
 - 3. Seal or solder exterior wall scupper flanges into back of conductor head.
- E. Conductor Heads: Anchor securely to wall with elevation of conductor top edge 1 inch below scupper discharge.

3.6 INSTALLATION OF REGLETS AND COUNTERFLASHINGS

- A. Coordinate installation of reglets and counterflashings with installation of base flashings.
- B. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches over top edge of base flashings.
- C. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches over top edge of base flashings. Lap counterflashing joints a minimum of 4 inches and bed with butyl sealant. Fit counterflashings tightly to base flashings.

3.7 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.
- D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 71 00

SECTION 07 72 00 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Roof hatches.

- B. Related Requirements:

- 1. Section 05 50 00 "Metal Fabrications" for metal vertical ladders, ships' ladders, and stairs for access to roof hatches.
 - 2. Section 07 62 00 "Sheet Metal Flashing and Trim" for shop- and field-formed metal flashing, roof-drainage systems, roof expansion-joint covers, and miscellaneous sheet metal trim and accessories.
 - 3. Section 07 71 00 "Roof Specialties" for manufactured fasciae, copings, gravel stops, gutters and downspouts, and counterflashing.

1.3 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.
- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of roof accessory.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

- B. Shop Drawings: For roof accessories.

1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

- C. Samples: For each exposed product and for each color and texture specified, prepared on Samples of size to adequately show color.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.
2. Method of attaching roof accessories to roof or building structure.
3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.
4. Required clearances.

- B. Sample Warranties: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

1.7 WARRANTY

- A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Material Completion.

PART 2 - PRODUCTS**2.1 PERFORMANCE REQUIREMENTS**

- A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Wind-Restraint Performance: As indicated on Drawings.

2.2 ROOF HATCHES

- A. Roof Hatches: Metal roof-hatch units with lids and insulated double-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, straight sides, and integrally formed deck-mounting flange at perimeter bottom. Interior finishes shall line roof penetrations and extend to the underside of the roof hatch frame.
 - 1. Manufacturers: Subject to compliance with requirements, provide prefabricated roof hatch units by one of the following:
 - a. Bilco Co.; New Haven, CT
 - b. Nystom Building Products
 - c. Milcor Inc.; Lima, OH
 - d. O'Keefe's, Inc.; San Francisco, CA
 - e. Nystrom Building Products
 - f. Babcock-Davis
 - g. Activar - J.L. Industries
 - h. Acudor Products
 - B. Type and Size: Single-leaf lid, 36 by 54 inches.
 - C. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.
 - D. Hatch Material: Aluminum sheet.
 - 1. Thickness: Manufacturer's standard thickness for hatch size indicated.
 - 2. Finish: Two-coat fluoropolymer.
 - 3. Color: As selected by Design Professional from manufacturer's full range.
 - E. Construction:
 - 1. Insulation: 2-inch-thick, polyisocyanurate board.
 - a. R-Value: 12.0 according to ASTM C1363.
 - 2. Nailer: Factory-installed wood nailer continuous around hatch perimeter.

3. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.
 4. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
 5. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
 6. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
 7. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate curb with perimeter curb height that is tapered to accommodate roof slope so that top surfaces of perimeter curb are level. Equip hatch with water diverter or cricket on side that obstructs water flow.
- F. Hardware: Spring operators, hold-open arm, stainless steel spring latch with turn handles, stainless steel butt- or pintle-type hinge system, and padlock hasps inside and outside.
- G. Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.
1. Height: 42 inches above finished roof deck.
 2. Posts and Rails: Galvanized-steel pipe, 1-1/4 inches in diameter or galvanized-steel tube, 1-5/8 inches in diameter.
 3. Flat Bar: Galvanized steel, 2 inches high by 3/8 inch thick.
 4. Maximum Opening Size: System constructed to prevent passage of a sphere 21 inches in diameter.
 5. Chain Passway Barrier: Galvanized proof coil chain with quick link on fixed end.
 6. Self-Latching Gate: Fabricated of same materials and rail spacing as safety railing system. Provide manufacturer's standard hinges and self-latching mechanism.
 7. Post and Rail Tops and Ends: Weather resistant, closed or plugged with prefabricated end fittings.
 8. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members.
 9. Fabricate joints exposed to weather to be watertight.
 10. Fasteners: Manufacturer's standard, finished to match railing system.
 11. Finish: Manufacturer's standard.
 - a. Color: As selected by Design Professional from manufacturer's full range.

2.3 METAL MATERIALS

- A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A653/A653M, G90 coating designation.
1. Mill-Phosphatized Finish: Manufacturer's standard for field painting.
 2. Factory Prime Coating: Where field painting is indicated, apply pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat, with a minimum dry film thickness of 0.2 mil.

3. Exposed Coil-Coated Finish: Prepainted by the coil-coating process to comply with ASTM A755/A755M. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer Finish: AAMA 621. System consisting of primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight.
 4. Baked-Enamel or Powder-Coat Finish: After cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat to a minimum dry film thickness of 2 mils.
 5. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester-backer finish consisting of prime coat and wash coat, with a minimum total dry film thickness of 0.5 mil.
- B. Aluminum Sheet: ASTM B209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.
1. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
- C. Aluminum Extrusions and Tubes: ASTM B221, manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.
- D. Stainless Steel Sheet and Shapes: ASTM A240/A240M or ASTM A666, Type 304.
- E. Steel Shapes: ASTM A36/A36M, hot-dip galvanized according to ASTM A123/A123M unless otherwise indicated.
- F. Steel Tube: ASTM A500/A500M, round tube.
- G. Galvanized-Steel Tube: ASTM A500/A500M, round tube, hot-dip galvanized according to ASTM A123/A123M.
- H. Steel Pipe: ASTM A53/A53M, galvanized.
- 2.4 MISCELLANEOUS MATERIALS
- A. Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
 - B. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.
 - C. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, acceptable to authorities having jurisdiction, containing no arsenic or chromium, and complying with AWPA C2; not less than 1-1/2 inches thick.

D. Underlayment:

1. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
2. Polyethylene Sheet: 6-mil- thick polyethylene sheet complying with ASTM D4397.
3. Slip Sheet: Building paper, 3 lb/100 sq. ft. minimum, rosin sized.
4. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.

E. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:

1. Fasteners for Zinc-Coated or Aluminum-Zinc Alloy-Coated Steel: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A153/A153M or ASTM F2329.
2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless Steel Sheet: Series 300 stainless steel.

F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.

G. Elastomeric Sealant: ASTM C920, elastomeric polyurethane polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

H. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for expansion joints with limited movement.

I. Asphalt Roofing Cement: ASTM D4586/D4586M, asbestos free, of consistency required for application.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install roof accessories according to manufacturer's written instructions.
 - 1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
 - 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
 - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 - 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - 1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
 - 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Roof-Hatch Installation:
 - 1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
 - 2. Attach safety railing system to roof-hatch curb.
 - 3. Attach ladder-assist post according to manufacturer's written instructions.
- D. Seal joints with sealant – type as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A780/A780M.
- B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 09 91 13 "Exterior Painting."
- C. Clean exposed surfaces according to manufacturer's written instructions.
- D. Clean off excess sealants.
- E. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 72 00

SECTION 07 81 00 - APPLIED FIRE PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Sprayed fire-resistive materials.

1.3 DEFINITIONS

- A. SFRM: Sprayed fire-resistive materials.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review products, design ratings, restrained and unrestrained conditions, densities, thicknesses, bond strengths, and other performance requirements.

1.5 ACTION SUBMITTALS

- A. Product Data: For the following:
 - 1. Sprayed fire-resistive material.
 - 2. Substrate primers.
 - 3. Bonding agent.
 - 4. Sealer.
- B. Shop Drawings: Framing plans or schedules, or both, indicating the following:
 - 1. Extent of fire protection for each construction and fire-resistance rating.
 - 2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
 - 3. Minimum sprayed fire-resistive material thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
 - 4. Treatment of sprayed fire-resistive material after application.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and testing agency.
- B. Product Certificates: For each type of sprayed fire-resistive material.
- C. Evaluation Reports: For sprayed fire-resistive material, from ICC-ES.
- D. Field quality-control reports.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by sprayed fire-resistive material manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.
- B. Mockups: Build mockups to set quality standards for materials and execution.
 - 1. Build mockup of each type of fire protection and different substrate as directed by Design Professional.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Design Professional specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Material Completion.

1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on field mockups of fire protection.
 - 1. Provide test specimens and assemblies representative of proposed materials and construction.
- B. Preconstruction Adhesion and Compatibility Testing: Test for compliance with requirements for specified performance and test methods.
 - 1. Bond Strength: Test for cohesive and adhesive strength according to ASTM E736. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
 - 2. Density: Test for density according to ASTM E605. Provide density indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
 - 3. Verify that manufacturer, through its own laboratory testing or field experience, attests that primers or coatings are compatible with sprayed fire-resistive material.
 - 4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 5. For materials failing tests, obtain sprayed fire-resistive material manufacturer's written instructions for corrective measures including the use of specially formulated bonding agents or primers.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply fire protection when ambient or substrate temperature is 44 deg F or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of fire protection, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fire protection dries thoroughly.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Assemblies: Provide fire protection, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.
- B. Source Limitations: Obtain fire protection from single source.
- C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Steel members are to be considered unrestrained unless specifically noted otherwise.
- D. Asbestos: Provide products containing no detectable asbestos.

2.2 SPRAYED FIRE-RESISTIVE MATERIALS

- A. Sprayed Fire-Resistive Material in all areas indicated on Drawings to receive sprayed fire-resistive material as required per the UL design number to achieve the designated fire-rating: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application.
 - 1. Application: Designated for exterior use by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Bond Strength: Minimum 150-lbf/sq. ft. cohesive and adhesive strength based on field testing according to ASTM E736.
 - 3. Density: Not less than density specified in the approved fire-resistance design, according to ASTM E605.
 - 4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E605, whichever is thicker, but not less than 0.375 inch.
 - 5. Combustion Characteristics: ASTM E136.
 - 6. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

- a. Flame-Spread Index: 10 or less.
 - b. Smoke-Developed Index: 10 or less.
7. Corrosion Resistance: No evidence of corrosion according to ASTM E937.
 8. Deflection: No cracking, spalling, or delamination according to ASTM E759.
 9. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E760.
 10. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. in 24 hours according to ASTM E859.
 11. Fungal Resistance: Treat products with manufacturer's standard antimicrobial formulation to result in no growth on specimens per ASTM G21.
 12. Finish: As selected by Design Professional from manufacturer's standard finishes.
 - a. Color: As selected by Design Professional from manufacturer's full range.

2.3 AUXILIARY MATERIALS

- A. Provide auxiliary materials that are compatible with sprayed fire-resistive material and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved by sprayed fire-resistive material manufacturer and complying with one or both of the following requirements:
 1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 2. Primer's bond strength in required fire-resistance design complies with specified bond strength for sprayed fire-resistive material and with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests according to ASTM E736.
- C. Bonding Agent: Product approved by sprayed fire-resistive material manufacturer and complying with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.
- D. Sealer: Transparent-drying, water-dispersible, tinted protective coating recommended in writing by sprayed fire-resistive material manufacturer for each fire-resistance design.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design.

1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fire protection with substrates under conditions of normal use or fire exposure.
 2. Verify that objects penetrating fire protection, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
 3. Verify that substrates receiving fire protection are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fire protection application.
- B. Verify that concrete work on steel deck is complete before beginning Work.
- C. Verify that roof construction, installation of rooftop HVAC equipment, and other related work are complete before beginning Work.
- D. Conduct tests according to sprayed fire-resistive material manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.
- E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.
- 3.2 PREPARATION
- A. Cover other work subject to damage from fallout or overspray of fire protection materials during application.
 - B. Clean substrates of substances that could impair bond of fire protection.
 - C. Prime substrates where included in fire-resistance design and where recommended in writing by sprayed fire-resistive material manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fire protection.
 - D. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fire protection. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.
- 3.3 APPLICATION
- A. Construct fire protection assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fire protection Work.
 - B. Comply with sprayed fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fire

protection; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.

- C. Coordinate application of fire protection with other construction to minimize need to cut or remove fire protection.
 - 1. Do not begin applying fire protection until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
 - 2. Defer installing ducts, piping, and other items that would interfere with applying fire protection until application of fire protection is completed.
- D. Metal Decks:
 - 1. Do not apply fire protection to underside of metal deck substrates until concrete topping, if any, is completed.
 - 2. Do not apply fire protection to underside of metal roof deck until roofing is completed; prohibit roof traffic during application and drying of fire protection.
- E. Install auxiliary materials as required, as detailed, and according to fire-resistance design and sprayed fire-resistive material manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by sprayed fire-resistive material manufacturer.
- F. Spray apply fire protection to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by sprayed fire-resistive material manufacturer.
- G. Extend fire protection in full thickness over entire area of each substrate to be protected.
- H. Install body of fire protection in a single course unless otherwise recommended in writing by sprayed fire-resistive material manufacturer.
- I. For applications over encapsulant materials, including lockdown (post-removal) encapsulants, apply fire protection that differs in color from that of encapsulant over which it is applied.
- J. Where sealers are used, apply products that are tinted to differentiate them from fire protection over which they are applied.
- K. Provide a uniform finish complying with description indicated for each type of fire protection material and matching finish approved for required mockups.
- L. Cure fire protection according to sprayed fire-resistive material manufacturer's written instructions.
- M. Do not install enclosing or concealing construction until after fire protection has been applied, inspected, and tested and corrections have been made to deficient applications.
- N. Finishes: Where indicated, apply fire protection to produce the following finishes:

1. Manufacturer's Standard Finishes: Finish according to manufacturer's written instructions for each finish selected.
2. Spray-Textured Finish: Finish left as spray applied with no further treatment.
3. Rolled, Spray-Textured Finish: Even finish produced by rolling spray-applied finish with a damp paint roller to remove drippings and excessive roughness.
4. Skip-Troweled Finish: Even leveled surface produced by troweling spray-applied finish to smooth out the texture and neaten edges.
5. Skip-Troweled Finish with Corner Beads: Even, leveled surface produced by troweling spray-applied finish to smooth out the texture, eliminate surface markings, and square off edges.

3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
 1. Test and inspect as required by the IBC, Subsection 1705.13, "Sprayed Fire-Resistant Materials."
- B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fire protection for the next area until test results for previously completed applications of fire protection show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.
- C. Fire protection will be considered defective if it does not pass tests and inspections.
 1. Remove and replace fire protection that does not pass tests and inspections, and retest.
 2. Apply additional fire protection, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.
- D. Prepare test and inspection reports.

3.5 CLEANING

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.

3.6 PROTECTION

- A. Protect fire protection, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fire protection is without damage or deterioration at time of Substantial Completion.

3.7 REPAIRS

- A. As installation of other construction proceeds, inspect fire protection and repair damaged areas and fire protection removed due to work of other trades.
- B. Repair fire protection damaged by other work before concealing it with other construction.
- C. Repair fire protection by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 07 81 00

SECTION 07 84 13 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Penetration firestopping systems for the following applications:
 - a. Penetrations in fire-resistance-rated walls.
 - b. Penetrations in horizontal assemblies.

B. Related Requirements:

1. Section 07 84 43 "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Before installation of fire-resistance-rated assemblies and penetrating items, review penetration firestopping system and examine procedures for ensuring quality of installed systems. Require representatives of each entity directly concerned with penetration firestopping system to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for penetration firestopping system.
 - c. Penetration firestopping system manufacturer's field representative.
 - d. Penetration firestopping system Installer.
 - e. Fire-resistance-rated masonry Installer.
 - f. Fire-resistance-rated gypsum board assembly Installer.
 - g. Mechanical piping Installer.
 - h. HVAC ductwork Installer.
 - i. Electrical wireway Installer.
2. Review inspection and testing and inspecting agency procedures for field quality control, penetration firestopping system installation, and coordination of penetrating item configurations with available rated penetration firestopping system assemblies.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

- B. Shop Drawings: For each penetration firestopping system, show each kind of construction condition penetrated, relationships to adjoining construction, and kind of penetrating item. Include firestop design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.
1. Submit documentation, including illustrations, from a qualified testing and inspecting agency that is applicable to each penetration firestopping system configuration for construction and penetrating item.
 2. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.
- C. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For firm and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
- C. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

- A. Installation Responsibility: Assign installation of penetration firestopping systems and joint firestopping systems in Project to a single qualified firestop subcontractor.
- B. Source Limitations: Obtain penetration firestopping and joint firestopping systems through one source from a single manufacturer.
- C. Installer Qualifications: A firm who is qualified by having the necessary experience, staff, and training to install manufacturer's products per specified requirements. Firm shall hold current

certification by third party attesting to its ability to select and install firestopping and employ trained supervisors to maintain oversight of firestopping installation.

1. Certification of Firestopping Firms: Firm shall have a minimum of ten (10) years experience in firestopping and comply with one of the following:
 - a. FM 4991 Approved Contractor.
 - b. UL Qualified Firestop Contractor Program.
 - c. Firestop Installers Training (FIT) Level 1 by Specified Technologies, Inc.
 - d. Certified 3M Trained by 3M Fire Protection Products.
 - e. Similar training by other manufacturers listing in Part 2.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.
- C. Notify Owner's inspecting agency at least seven days in advance of penetration firestopping system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up penetration firestopping system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined and approved each installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article.
Provide rated systems complying with the following requirements:

- a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."
 - 2) Intertek Group in its "Directory of Listed Building Products."
 - 3) FM Approval in its "Approval Guide."

B. VOC Content: Exposed sealants and sealant primers shall comply with the following:

1. Architectural sealants shall have a VOC content of 250 g/L or less.
2. Sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
3. Sealant primers for porous substrates shall have a VOC content of 775 g/L or less.

2.2 PENETRATION FIRESTOPPING SYSTEMS

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti North America.
 - c. Specified Technologies Inc.
 - d. Tremco Fire Protection Systems.
- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.

1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.
- E. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.
- 1.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
1. Permanent forming/damming/backing materials.
 2. Substrate primers.
 3. Collars.
 4. Steel sleeves.

2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.

-
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.
 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Designation of applicable testing and inspecting agency.
 4. Date of installation.
 5. Manufacturer's name.
 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2174.

- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION 07 84 13

SECTION 07 84 43 - JOINT FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.
2. Joints at exterior curtain-wall/floor intersections.

B. Related Requirements:

1. Section 07 84 13 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers and for wall identification.
2. Section 07 95 13.13 "Interior Expansion Joint Cover Assemblies" for fire-resistive manufactured expansion-joint cover assemblies for interior floors, walls, and ceilings.
3. Section 07 95 13.16 "Exterior Expansion Joint Cover Assemblies" for fire-resistive manufactured expansion-joint cover assemblies for exterior building walls, soffits, and parapets.
4. Section 09 22 16 "Non-Structural Metal Framing" for firestop tracks for metal-framed partition heads.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.
 1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Approvals according to FM Approvals 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.8 COORDINATION

- A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of joints to accommodate joint firestopping systems.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
 - 1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
 - 2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."

- 2) Intertek Group in its "Directory of Listed Building Products."

2.2 JOINT FIRESTOPPING SYSTEMS

- A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.
 1. Manufacturers: Subject to compliance with requirement, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti North America.
 - c. Specified Technologies Inc.
 - d. Tremco Fire Protection Systems.
 2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- C. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E2307.
 1. Manufacturers: Subject to compliance with requirement, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti North America.
 - c. Specified Technologies Inc.
 - d. Tremco Fire Protection Systems.
 2. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
- D. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.
- E. Accessories: Provide components of joint firestopping systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Surface Cleaning: Before installing joint firestopping systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
 - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install joint firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install elastomeric fill materials for joint firestopping systems by proven techniques to produce the following results:
 - 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
 - 2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
 - 3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

- A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
 2. Contractor's name, address, and phone number.
 3. Designation of applicable testing agency.
 4. Date of installation.
 5. Manufacturer's name.
 6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E2393.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated joint firestopping systems immediately and install new materials to produce joint firestopping systems complying with specified requirements.

END OF SECTION 07 84 43

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Mildew-resistant joint sealants.
3. Latex joint sealants.
4. Acoustical joint sealants.

B. Related Requirements:

1. Section 04 20 00 "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
2. Section 08 80 00 "Glazing" for glazing sealants.
3. Section 09 29 00 "Gypsum Board" for sealing perimeter joints.
4. Section 09 30 13 "Ceramic Tiling" for control joint sealants in ceramic tile installations.
5. Section 09 51 13 "Acoustical Panel Ceilings" for sealing edge moldings at perimeters with acoustical sealant.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.

- B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch-wide joints formed between two 6-inch-long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

- C. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation.
2. Joint-sealant manufacturer and product name.
3. Joint-sealant formulation.

4. Joint-sealant color.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Test Reports: For each kind of joint sealant, for tests performed by manufacturer and witnessed by a qualified testing agency.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
- B. Product Testing: Test joint sealants using a qualified testing agency.
 1. Testing Agency Qualifications: Qualified according to ASTM C1021 to conduct the testing indicated.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 1. Adhesion Testing: Use ASTM C794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 2. Compatibility Testing: Use ASTM C1087 to determine sealant compatibility when in contact with glazing and gasket materials.
 3. Submit manufacturer's recommended number of pieces of each type of material, including joint substrates, joint-sealant backings, and miscellaneous materials.
 4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 5. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures, including use of specially formulated primers.
 6. Testing will not be required if joint-sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with joint substrates and other materials matching those submitted.
- B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 2. Conduct field tests for each kind of sealant and joint substrate.

3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C1193 or Method A, Tail Procedure, in ASTM C1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.8 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 2. When joint substrates are wet.
 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.9 WARRANTY

- A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Two years from date of Material Completion.
- B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 1. Warranty Period: Five years from date of Material Completion.

- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 2. Disintegration of joint substrates from causes exceeding design specifications.
 3. Mechanical damage caused by individuals, tools, or other outside agents.
 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.
- C. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.
1. Products: Subject to compliance with requirements, provide one of the following :
 - a. Dow Corning Corporation; 790.
 - b. Momentive Performance Materials, Inc.; SilPruf LM SCS2700.
 - c. Pecora Corporation; 890 NTS.
 - d. Sika Corporation, Construction Products Division; SikaSil-C990.
 - e. Tremco Incorporated; Spectrem 1.
- B. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 50, Use NT.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 795.
 - b. GE Advanced Materials - Silicones; SilPruf NB SCS9000.
 - c. Pecora Corporation; 864.
 - d. Tremco Incorporated; Spectrem 3.

- C. Silicone, S, P, 100/50, T: Single-component, pourable, plus 100 percent and minus 50 percent movement capability traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade P, Class 100/50, Use T.

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

- a. Dow Corning Corporation; 890-SL .
- b. Pecora Corporation; 300 SL.
- c. Tremco Incorporated; Spectrem 900 SL.

- D. Textured, Field Tintable, Non-staining Neutral-curing Silicone Sealant ES-5:

1. Basis of Design: Pecora 890FTS-TXTR

2.3 URETHANE JOINT SEALANTS

- A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

2.4 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.

- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.

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

- a. Pecora Corporation; 898.
- b. Dow Corning Corporation; 786 Mildew Resistant.
- c. Momentive Performance Materials, Inc.; SCS1700 Sanitary.
- d. Tremco Incorporated; Tremsil 200 Sanitary.

2.5 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

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

- a. Bostik, Inc.; Chem-Calk 600.
- b. Pecora Corporation; AC-20+.
- c. Tremco Incorporated; Tremflex 834.

2.6 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Sealant for Exposed and Concealed Joints AS-1: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834 that effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.
1. Products:
 - a. Pecora Corporation; AC-20 FTR Acoustical and Insulation Sealant.
 - b. United States Gypsum Co.; SHEETROCK Acoustical Sealant.
- B. Acoustical Sealant for Concealed Joints AS-2: Manufacturer's standard, nondrying, nonhardening, nonskinning, nonstaining, gunnable, synthetic-rubber sealant recommended for sealing interior concealed joints to reduce airborne sound transmission.
1. Products:
 - a. Pecora Corporation; BA-98.
 - b. Tremco; Tremco Acoustical Sealant.
- C. Acoustical Fire Rated Outlet Backer Pad
1. Basis of Design: IsoBacker from Kinetics Noise Control.

2.7 JOINT-SEALANT BACKING

- A. Sealant Backing Material, General: Nonstaining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.8 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or

harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - d. Exterior insulation and finish systems.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to

comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C1193 unless otherwise indicated.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 92 00

SECTION 07 95 13.13 - INTERIOR EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes interior expansion joint cover assemblies.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for expansion joint cover assemblies.
- B. Shop Drawings: For each expansion joint cover assembly.
 - 1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.
 - 2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
- C. Samples: For each expansion joint cover assembly and for each color and texture specified, full width by 6 inches long in size.
- D. Expansion Joint Cover Assembly Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:
 - 1. Manufacturer and model number for each expansion joint cover assembly.
 - 2. Expansion joint cover assembly location cross-referenced to Drawings.
 - 3. Nominal, minimum, and maximum joint width.
 - 4. Movement direction.
 - 5. Materials, colors, and finishes.
 - 6. Product options.
 - 7. Fire-resistance ratings.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each fire-resistance-rated expansion joint cover assembly, for tests performed by a qualified testing agency.

1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Build mockup of typical expansion joint cover assembly.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Material Completion.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Furnish units in longest practicable lengths to minimize field splicing.
- B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to ASTM E1966 by a qualified testing agency.
 - 1. Hose Stream Test: Wall-to-wall and wall-to-ceiling assemblies shall be subjected to hose stream testing.

2.3 FLOOR EXPANSION JOINT COVERS

- A. Metal-Plate Floor Joint Cover: Metal cover plate fixed on one side of joint gap and free to slide on other.
 - 1. Application: Floor to floor and Floor to wall.
 - 2. Installation: Surface mounted.
 - 3. Load Capacity:
 - a. Uniform Load: 50 lb/sq. ft..
 - b. Concentrated Load: 300 lb.
 - c. Maximum Deflection: 0.0625 inch.

4. Fire-Resistance Rating: Not less than that indicated on Drawings.
5. Cover-Plate Design: Plain.
6. Exposed Metal:
 - a. Aluminum: Clear anodic, Class I.

2.4 WALL EXPANSION JOINT COVERS

- A. Metal-Plate Wall Joint Cover: Metal cover plate fixed on one side of joint gap and free to slide on other.
 1. Application: Wall to wall and Wall to corner.
 2. Fire-Resistance Rating: Not less than that indicated on Drawings.
 3. Exposed Metal:
 - a. Aluminum: Clear anodic, Class I.

2.5 CEILING EXPANSION JOINT COVERS

- A. Metal-Plate Ceiling Joint Cover: Metal cover plate fixed on one side of joint gap and free to slide on other.
 1. Application: Ceiling to ceiling and Wall to ceiling.
 2. Fire-Resistance Rating: Not less than that indicated on Drawings.
 3. Exposed Metal:
 - a. Aluminum: Clear anodic, Class I.

2.6 MATERIALS

- A. Aluminum: ASTM B221, Alloy 6063-T5 for extrusions; ASTM B209, Alloy 6061-T6 for sheet and plate.
 1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
- B. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to comply with performance criteria for required fire-resistance rating.
- C. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.
- D. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.7 ALUMINUM FINISHES

2.8 ACCESSORIES

- A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.
 - 1. Provide where indicated on Drawings.
- B. Manufacturer's standard attachment devices. Include anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces where expansion joint cover assemblies will be installed for installation tolerances and other conditions affecting performance of the Work.
- B. Notify Architect where discrepancies occur that will affect proper expansion joint cover assembly installation and performance.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion joint cover assemblies.

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.
- B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.
 - 1. Repair or grout block out as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
 - 2. Install frames in continuous contact with adjacent surfaces.

- a. Shimming is not permitted.
 3. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
 4. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
 5. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- C. Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
1. Provide in continuous lengths for straight sections.
 2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- D. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.
- E. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.
- F. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.
1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.
- G. Moisture Barrier Drainage: If indicated, provide drainage fittings and connect to drains.
- 3.4 PROTECTION
- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
 - B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over expansion joint cover assemblies. Reinstall cover plates or seals prior to Substantial Completion.

END OF SECTION 07 95 13.13

SECTION 07 95 13.16 - EXTERIOR EXPANSION JOINT COVER ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Exterior expansion joint covers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for expansion joint cover assemblies.

B. Shop Drawings: For each expansion joint cover assembly.

1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.
2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.

C. Samples: For each exposed expansion joint cover assembly and for each color and texture specified, full width by 6 inches long in size.

D. Expansion Joint Cover Assembly Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:

1. Manufacturer and model number for each expansion joint cover assembly.
2. Expansion joint cover assembly location cross-referenced to Drawings.
3. Nominal, minimum, and maximum joint width.
4. Movement direction.
5. Materials, colors, and finishes.
6. Product options.
7. Fire-resistance ratings.

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each fire-resistance-rated expansion joint cover assembly, for tests performed by a qualified testing agency.

1.4 MOCKUPS

- A. Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
 - 1. Build mockup of typical expansion joint cover assembly.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Design Professional specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Material Completion.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Furnish units in longest practicable lengths to minimize field splicing.
- B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to ASTM E1966 by a qualified testing agency.
 - 1. Hose Stream Test: Wall-to-wall and wall-to-soffit assemblies shall be subjected to hose stream testing.

2.3 EXTERIOR EXPANSION JOINT COVERS

- A. Exterior Metal-Plate Joint Cover: Assembly consisting of sliding metal cover plate in continuous contact with gaskets mounted on metal frames fixed to sides of joint gap.
 - 1. Application: Wall to wall ,Wall to soffit and Soffit to soffit.
 - 2. Installation: Surface mounted.
 - 3. Exposed Metal:
 - a. Aluminum: Clear anodic, Class I.

2.4 MATERIALS

- A. Aluminum: ASTM B221, Alloy 6063-T5 for extrusions; ASTM B209, Alloy 6061-T6 for sheet and plate.
 - 1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
- B. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to comply with performance criteria for required fire-resistance rating.
- C. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.

2.5 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

2.6 ACCESSORIES

- A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.
- B. Manufacturer's standard attachment devices. Include anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces where expansion joint cover assemblies will be installed for installation tolerances and other conditions affecting performance of the Work.
- B. Notify Design Professional where discrepancies occur that will affect proper expansion joint cover assembly installation and performance.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.

- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion joint cover assemblies.

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.
- B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.
1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
 2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
 3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 4. Install frames in continuous contact with adjacent surfaces.
 - a. Shimming is not permitted.
 5. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- C. Elastomeric Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
1. Provide in continuous lengths for straight sections.
 2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
 3. Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- D. Preformed Foam Joint Seals: Install in compliance with manufacturer's written instructions. Install with minimum number of end joints.
1. Install each length of seal immediately after removing protective wrapping.
 2. Firmly secure compressed joint seals to joint gap side to obtain full bond using exposed pressure-sensitive adhesive or field-applied adhesive as recommended by manufacturer.
 3. Do not pull or stretch material. Produce seal continuity at splices, ends, turns, and intersections of joints.
 4. For applications at low ambient temperatures, heat foam joint seal material in compliance with manufacturer's written instructions.
- E. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.

- F. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.
- G. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.
 - 1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.
- H. Moisture Barrier Drainage: If indicated, provide drainage fitting and connect to drains.

3.4 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect the installation from damage by work of other Sections.

END OF SECTION 07 95 13.16

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:

- 1. Interior standard steel doors and frames.
- 2. Exterior standard steel doors and frames.

- B. Related Requirements:

- 1. Section 08 71 00 "Door Hardware" for door hardware for hollow-metal doors.
- 2. Section 08 80 00 "Glazing".
- 3. Division 26 "Electrical".
- 4. Division 27 "Communications".

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or ANSI/SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate requirements for installation of door hardware, and access control and security systems.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Elevations of each door type.
 - 2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
 - 3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 4. Locations of reinforcement and preparations for hardware.
 - 5. Details of each different wall opening condition.
 - 6. Details of electrical raceway and preparation for access control systems and security systems.
 - 7. Details of anchorages, joints, field splices, and connections.
 - 8. Details of accessories.
 - 9. Details of moldings, removable stops, and glazing.
- C. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.
 - 1. Refer to Section 08 71 00 "Door Hardware" for final door hardware schedule.

1.7 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of fire-rated hollow-metal door and frame assembly for tests performed by a qualified testing agency indicating compliance with performance requirements.

1.8 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of door numbers and applicable room name and number to which door accesses.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with one removable spreader bar across bottom of frames, tack welded to jambs and mullions.

- C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch-high wood blocking. Provide minimum 1/4- inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ceco Door Products; an Assa Abloy Group company.
 2. Curries Company; an Assa Abloy Group company.
 3. Fleming Door Products, Ltd.
 4. Pioneer Industries
 5. Republic Doors & Frames
 6. Steelcraft; an Ingersoll-Rand company.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.

2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B. At locations indicated in the Door and Frame Schedule.
1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Uncoated steel sheet, minimum thickness of 0.042 inch, 18 gauge.
 - d. Edge Construction: Model 2, Seamless.
 - e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
 - f. Core: Manufacturer's standard Polystyrene.
 - g. Fire-Rated Core: Manufacturer's standard vertical steel stiffener core for fire-rated and temperature-rise-rated doors.

2. Frames:

- a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
 - b. Sidelite and Transom Frames: Fabricated from same thickness material as adjacent door frame.
 - c. Construction: Die-mitered, tabbed interlocked construction, face welded seams.
3. Exposed Finish: Prime.

2.4 EXTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A. At locations indicated in the Door and Frame Schedule.

1. Doors:

- a. Type: As indicated in the Door and Frame Schedule.
- b. Thickness: 1-3/4 inches.
- c. Face: Metallic-coated steel sheet, minimum thickness of 0.067 inch, 16 gauge, with minimum A60 coating.
- d. Edge Construction: Model 2, Seamless.
- e. Edge Bevel: Provide manufacturer's standard beveled or square edges.
- f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
- g. Bottom Edges: Close bottom edges of doors where required for attachment of weather stripping with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
- h. Core: Manufacturer's standard.
- i. Fire-Rated Core: Manufacturer's standard vertical steel stiffener with insulation core for fire-rated doors.

2. Frames:

- a. Materials: Metallic-coated steel sheet, minimum thickness of 0.067 inch, 16 gauge, with minimum A60 coating.
- b. Construction: Die-mitered, tabbed interlocked construction, face welded seams.

3. Exposed Finish: Prime.

2.5 FRAME ANCHORS

A. Jamb Anchors:

1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.

2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
 3. Postinstalled Expansion Anchor: Minimum 3/8-inch- diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.
- D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized according to ASTM A153/A153M, Class B.

2.6 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A153/A153M.
- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- F. Mineral-Fiber Insulation: ASTM C665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively; passing ASTM E136 for combustion characteristics.
- G. Glazing: Comply with requirements in Section 08 80 00 "Glazing."

2.7 FABRICATION

- A. Door Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated. Extend minimum 3/4 inch beyond edge of door on which astragal is mounted or as required to comply with published listing of qualified testing agency.

- B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.
 3. Frames to receive electrified hardware shall have factory installed conduit stubs from the device/transfer. Specified frame cables in 08 71 00 shall be preinstalled in the frame prior to deliver to the project site. Additional cable shall be uniformly spooled, polybagged, and nested in the head of the frame. All conduit connections shall be made watertight.
 4. Doors to receive electrified hardware shall have factory installed cables. The cables are specified in 08 71 00. Deliver the hollow metal doors to be project site with these cables installed.
 5. Frames installed in masonry frames shall have their hardware reinforcements protected against slurry penetration and sealed. Hardware reinforcements shall be foamed to ensure proper screw fastening for surface applied hardware which includes weatherstripping

2.8 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory prior to setting the frame. Shipping spreaders shall not be used as setting spreaders. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive non-templated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

- A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.
 - 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
 - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
 - b. Install frames with removable stops located on secure side of opening.
 - 2. Fire-Rated Openings: Install frames according to NFPA 80.
 - 3. Floor Anchors: Secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 - 4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout or mortar.
 - 5. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 - 6. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:
 - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.

- C. Hollow-Metal Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
 - 1. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 - 2. Smoke-Control Doors: Install doors according to NFPA 105.
- D. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 FIELD QUALITY CONTROL

- A. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- B. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.

3.4 REPAIR

- A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.
- C. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08 11 13

SECTION 08 14 16 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Five-ply flush wood veneer-faced doors for transparent finish.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

B. Related Requirements:

1. Section 08 11 13 "Hollow Metal Doors and Frames".
2. Section 08 41 13 "Aluminum-Framed Entrances and Storefronts".
3. Section 08 71 00 "Door Hardware".
4. Section 08 80 00 "Glazing".
5. Division 26 "Electrical".
6. Division 27 "Communications".

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Door louvers.
5. Door trim for openings.
6. Factory-machining criteria.
7. Factory- finishing specifications.

- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Details of frame for each frame type, including dimensions and profile.
4. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
5. Dimensions and locations of blocking for hardware attachment.
6. Dimensions and locations of mortises and holes for hardware.
7. Clearances and undercuts.
8. Requirements for veneer matching.
9. Doors to be factory finished and application requirements.

C. Samples for Initial Selection: For factory-finished doors.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Special warranties.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of referenced standard and manufacturer's written instructions.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install doors until building is enclosed and weathertight, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.9 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Delamination of veneer.
 - b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.

2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain flush wood doors from single manufacturer.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Graham Wood Doors; a Masonite company.
 2. Lambton Doors.
 3. Oshkosh Doors.
 4. VT Industries, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Wood Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with UL 10C or NFPA 252.
- B. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.3 SOLID-CORE FIVE-PLY FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Doors:
 1. Performance Grade: ANSI/WDMA I.S. 1A Heavy Duty.
 2. ANSI/WDMA I.S. 1A Grade: Custom.
 3. Faces: Single-ply wood veneer not less than 1/50 inch thick.
 - a. Species: Select white birch.
 - b. Cut: Rotary cut .
 - c. Match between Veneer Leaves: Book match.
 - d. Assembly of Veneer Leaves on Door Faces: Center-balance match.
 - e. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.

4. Exposed Vertical and Top Edges: Same species as faces or a compatible species - Architectural Woodwork Standards edge Type A.
 - a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
 - b. Fire-Rated Pairs of Doors: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
 - c. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
 - 1) Screw-Holding Capability: 475 lbf in accordance with WDMA T.M. 10.
5. Core for Non-Fire-Rated Doors:
 - a. ANSI A208.1, Grade LD-1 particleboard.
 - b. Half glass, full glass, and dual lite doors shall be Grade structural composite lumber doors, SCL.
6. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.
 - a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated on Drawings as needed to eliminate through-bolting hardware.
7. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

2.4 LIGHT FRAMES AND LOUVERS

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
 1. Wood Species: Same species as door faces.
 2. Profile: Flush rectangular beads.
 3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.
- B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated on Drawings. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.

2.5 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated.
 - 1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 - 2. Comply with NFPA 80 requirements for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied.
 - 1. Locate hardware to comply with DHI-WDHS-3.
 - 2. Comply with final hardware schedules, door frame Shop Drawings, ANSI/BHMA-156.115-W, and hardware templates.
 - 3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
 - 4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
 - 5. Metal Astragals: Factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
 - 6. Provide for factory installed ElectroLynx cables where electrified locks or exit devices are prepared. Reference specification 08 71 00 for those requirements. All door cables shall comply with the SCCPSS plug-n-play Molex connectivity
 - 7.
- C. Openings: Factory cut and trim openings through doors.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
 - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 08 80 00 "Glazing."

2.6 FACTORY FINISHING

- A. Comply with referenced quality standard for factory finishing.
 - 1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - 2. Finish faces, all four edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Transparent Finish:
 - 1. Architectural Woodwork Standards and ANSI/WDMA I.S. 1A Grade: Custom.
 - 2. Finish: Architectural Woodwork Standards System-11, Polyurethane, Catalyzed.
 - 3. Staining: As selected by Architect from manufacturer's full range.
 - 4. Effect: Filled finish.
 - 5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 08 71 00 "Door Hardware."
- B. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 FIELD QUALITY CONTROL

- A. Repair or remove and replace installations where inspections indicate that they do not comply with specified requirements.
- B. Reinspect repaired or replaced installations to determine if replaced or repaired door assembly installations comply with specified requirements.
- C. Engage in continuity checks of all factory installed cables to ensure integrity prior to installing the electrified hardware. Replace all cables where any continuity failures occur.

3.4 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 08 14 16

SECTION 08220 - FIBERGLASS REINFORCED PLASTIC DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section Includes the Following:
 - 1. Fiberglass Reinforced Plastic (FRP) Doors
 - 2. Fiberglass Resin Transfer Molded Door Frames

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product
 - 1. Include details of construction and glazing.
 - 2. Include factory-finishing specifications.
- B. Shop Drawings: For stile and rail wood doors. Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data, including the following:
 - 1. Dimensions of doors for factory fitting.
 - 2. Locations and dimensions of mortises and holes for hardware.
 - 3. Undercuts.
 - 4. Doors to be factory finished and finish requirements.
 - 5. Fire-protection ratings for fire-rated doors.
- C. Samples for Initial Selection: For factory-finished doors.
- D. Samples for Verification: Corner sections of doors, approximately 8 by 10 inches, with door faces and edgings representing typical range of color and grain for each species of veneer and solid lumber required. Finish Sample with same materials proposed for factory-finished doors.]

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of door, from manufacturer.
- B. Sample Warranty: For special warranty.

- A. Quality Standard Compliance Certificates: Program certificates.
 - 1. Acknowledgment that products submitted meet requirements of standards referenced
 - 2. Manufacturer's installation instructions.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in opaque plastic bags or cardboard cartons.
- C. Mark each door on top or bottom rail with opening number used on Shop Drawings.

1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship, or have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section, or separation or delaminating, and expansion of the core. Within specified warranty period.
 - 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 - 2. Warranty shall be in effect during the following period from date of Material Completion:
 - a. Exterior Doors: Ten years.
 - b. Interior Doors: Life of installation.
 - c. Insulating Glass Vision Panels: Five years.

PART 2 - PRODUCTS

1.1 MANUFACTURERS

- A. Source Limitations: Obtain Doors and frames from single manufacturer.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Corrim
 - b. Edgewater
 - c. Tiger
 - d. Simon 866-894-7511

1.2 MATERIALS

- A. Doors

1. General: Use only materials that comply with referenced standards and other requirements specified.
2. Face Panels: Standard face panels shall be chemical resistant, using a fiberglass-reinforced polyester resin system with light stabilizing additives. Thickness of panels shall be 0.090 to 0.125, with a standard of 0.120".
1. Finish: All surfaces shall have a smooth, or optional matte, seamless gel coat finish. Gel Coat coverage shall be 15 mil thick plus or minus 3 mils.
2. Color: As selected by Design Professional from manufacturer's standard, optional or custom colors.

B. Internal Construction

1. Stiles and Rails shall be constructed of rectangular and square high modulus pultruded fiberglass tubes.
2. Core material as application dictates.
3. Polyurethane Foam Core, 1 1/2" thick rigid block of polyurethane with an "R" factor of 11-12 shall be laminated to the interior of the face panels.
4. Internal reinforcements for full mortise hinges to be solid FRP blocking and for thru-bolted hardware to be high modulus pultrusion.

C. Frames

1. Head and Jamb: Pultruded fiberglass reinforced plastic, minimum 1/4" wall thickness, conforming to SDI requirements
2. Frame Profile: Double rabbeted with 5/8" stop. Face will be 2" with a jamb depth of as shown within door schedule
3. Joint Connection: Jamb to Head joints will be neatly mitered at 45 degrees
4. Finish: 15 mil +/- 3 mil gel coat finish. Color to match door unless otherwise indicated.
5. Corner: Reinforcement at frame corner will be pultruded fiberglass angle, 4" x 4" x 5 3/8" x 1/4"
6. Hardware: Frames will incorporate non-woven polyester fabric at mortise hinge, closer and strike locations for unparalleled screw-holding strength.
7. Anchors: CMU wire stainless steel

1.2 ACCESSORIES

- A. FRP Threshold with stainless steel anchors
- B. Weather strip and Door sweep manufactures standard finish to match frame.
- C. Hinges Bommer LB-8302, Sexnut and bolt mount on door
- D. Vision lites: Glass shall conform to ASTM 1992 for large and small missile impact test.

1.3 FABRICATION

- A. All doors shall be fitted at factory with the hinges, glazing, weather seals and threshold installed.

1. Locksets and closers shall be provided by Section 08 71 00 Door Hardware.
- B. Fabricate FRP doors and frames rigid, neat in appearance and free from defects.
- C. Form to sizes and profiles as indicated on drawings.
- D. In compliance with the hardware manufacturer's instructions and templates, doors and frames shall be mortised and reinforced for hardware, including hinges, locks, strikes, closers, etc.
- A. Bottom of frames will terminate at the indicated finished floor level.
- B. Clearances will be as follows:
 - a. Jamb and Head: 1/8 inch plus or minus 1/16 inch
 - b. Between Edges and Pairs of Doors: 1/8 inch plus or minus 1/16 inch
 - c. Between Bottom of Door and Threshold: Maximum 3/8 inch
 - d. Between Bottom of Door and Top of Finish Floor: Maximum 3/4 inch

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- B. Install doors and frames plumb, rigid, properly aligned and securely fastened in place. Install in accordance with manufacturer's instructions and NFPA 80 standards at fire rated openings.
- C. Where applicable, set frames in place prior to construction of enclosing walls and ceilings. Space between wall and frame may be solidly filled with mortar and anchors built into the joints as the walls are constructed.
- D. Check plumb, squareness and twist of frames as walls are constructed. Brace securely until permanently anchored. Shim as necessary to comply with installation tolerances.

- E. Remove temporary braces and spreaders necessary for installation only after frames have been properly set and secured.
- F. Locate anchors not more than 18 inches from top and bottom of frame. Space anchors not more than 32 inches o.c. and as follows: 1) Three anchors per jamb from 60 to 90 inches in height, 2) Four anchors per jamb from 90 to 96 inches in height.
- G. Protect frames during construction.
- H. Align doors in frames for uniform clearances at each edge.

3.3 ADJUSTING

- A. Adjust doors in accordance with door manufacturer's maintenance instructions to swing open and shut without binding and to remain in place at any angle without being moved by gravitational influence.
- A. Adjust door hardware to operate correctly in accordance with hardware manufacturer's maintenance instructions. Contact Simon Door Co. if help is required with hardware installation instructions; do not alter doors to fit hardware without prior approval.
- B. Finished Doors: Replace doors that are damaged or do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

3.3 CLEANING

- A. Clean all exposed surfaces, removing dirt and excess sealant from all exposed surfaces. Follow the manufacturer's maintenance instructions for proper techniques and products to clean all surfaces.
- B. Remove debris and leave work in complete and proper operating conditions.

END OF SECTION 08 22 00

SECTION 08 31 13 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Access doors and frames.
- 2. Fire-rated access doors and frames.

B. Related Requirements:

- 1. Section 07 72 00 "Roof Accessories" for roof hatches.
- 2. Section 23 33 00 "Air Duct Accessories" for heating and air-conditioning duct access doors.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.

B. Product Schedule: For access doors and frames.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For testing and inspecting agency.

- 1. Fire-Rated Door Inspector: Submit documentation of compliance with NFPA 80, Section 5.2.3.1.

1.5 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of applicable room name and number in which access door is located.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, according to NFPA 252 or UL 10B.

2.2 ACCESS DOORS AND FRAMES

A. Flush Access Doors with Concealed Flanges:

1. Manufacturers: Subject to compliance with requirements, provide access doors by one of the following:
 - a. JL Industries
 - b. Karp Associates, Inc.
 - c. Milcor; Hart & Cooley Inc.
 - d. Nystrom, Inc.
2. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
3. Optional Features: Piano hinges.
4. Locations: Wall and ceiling.
5. Door Size: As indicated on Schedule at the end of this Section.
6. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch, 16 gage factory primed.
7. Stainless Steel Sheet for Door: Nominal 0.062 inch, 16 gage, ASTM A480/A480M No. 4 finish.
8. Frame Material: Same material and thickness as door.
9. Latch and Lock: Cam latch, screwdriver operated.

2.3 FIRE-RATED ACCESS DOORS AND FRAMES

A. Fire-Rated, Flush Access Doors with Concealed Flanges:

1. Manufacturers: Subject to compliance with requirements, provide access doors by one of the following:
 - a. JL Industries
 - b. Karp Associates, Inc.
 - c. Milcor; Hart & Cooley Inc.
 - d. Nystrom, Inc.
2. Description: Door face flush with frame, with a core of mineral-fiber insulation enclosed in sheet metal; with concealed flange for gypsum board installation, self-closing door, and concealed hinge.
3. Optional Features: Piano hinges.

4. Locations: Wall and ceiling.
5. Door Size: As indicated on Schedule at the end of this Section.
6. Fire-Resistance Rating: Not less than that of adjacent construction.
7. Metallic-Coated Steel Sheet for Door: Nominal 0.040 inch, 20 gage, factory primed.
8. Stainless Steel Sheet for Door: Nominal 0.038 inch, 20 gage, ASTM A480/A480M No. 4 finish.
9. Frame Material: Same material, thickness, and finish as door.
10. Latch and Lock: Self-closing, self-latching door hardware, operated by key.

2.4 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879/A879M, with cold-rolled steel sheet substrate complying with ASTM A1008/A1008M, Commercial Steel (CS), exposed.
- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 or A60 metallic coating.
- D. Stainless Steel Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 304. Remove tool and die marks and stretch lines, or blend into finish.
- E. Frame Anchors: Same material as door face.
- F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.5 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.
- D. Latch and Lock Hardware:
 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
 2. Keys: Furnish two keys per lock and key all locks alike.

2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
- E. Stainless Steel Finishes:
 - 1. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
 - 2. Polished Finish: ASTM A480/A480M No. 4 finish. Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - a. Run grain of directional finishes with long dimension of each piece.
 - b. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

3.4 SCHEDULE

A. Provide and install access doors and frames for each condition and location indicated on Drawings and listed below:

| <i>Application</i> | <i>Quantity</i> | <i>Size</i> | <i>Fire Rating</i> | <i>Material</i> |
|---|-----------------|--------------|--------------------|-----------------|
| <i>Wall (Chase) Application</i> | | | | |
| Access to mechanical system gate valves | 1 per valve | 12" x 12" | See plan | Stainless |
| Access to controls – showers and tubs | 1 per unit | 12" x 12" | See plan | Stainless |
| Access to can wash hose bibb | 1 per hose bibb | 12" x 12" | See plan | Stainless |
| Access through smoke partitions | 1 per partition | 48" x 48" | Yes | Primed steel |
| <i>Ceiling Application</i> | | | | |
| Access through rated assembly | 1 per room | 24" x 36" | Yes | Primed steel |
| Access through plaster ceiling | 1 per room | 24" x 36" | See plan | Primed steel |
| Access through gypsum board ceiling | 1 per room | 24" x 36" | See plan | Primed steel |
| <i>Miscellaneous Areas</i> | | | | |
| Where shown or indicated on Drawings | As indicated | As indicated | See plan | Primed steel |

B. In addition to units listed above, provide and install the following in locations to be designated by the Design Professional and as required for access to systems components:

| <i>Application</i> | <i>Quantity</i> | <i>Size</i> | <i>Fire Rating</i> | <i>Material</i> |
|--------------------|-----------------|-------------|--------------------|-----------------|
| As required | 2 each | 12" x 12" | Yes | Stainless |
| As required | 2 each | 12" x 12" | No | Stainless |
| As required | 2 each | 24" x 36" | Yes | Primed steel |
| As required | 2 each | 24" x 36" | No | Primed steel |

C.

END OF SECTION 08 31 13

SECTION 08 33 13 - COILING COUNTER DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Counter door assemblies.
- B. Related Requirements:
 - 1. Section 05 50 00 "Metal Fabrications" for door-opening framing and corner guards.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of coiling counter door and accessory.
 - 1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.
 - 1. Include plans, elevations, sections, and mounting details.
 - 2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 - 4. Show locations of locking devices, and other accessories.
- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.
 - 1. Include similar Samples of accessories involving color selection.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For coiling counter doors to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain coiling counter doors from single source from single manufacturer.
 - 1. Obtain operators and controls from coiling counter door manufacturer.

2.2 COUNTER DOOR ASSEMBLY

- A. Counter Door: Coiling counter door formed with curtain of interlocking metal slats.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
 - a. Clopay Corporation
 - b. CornellCookson, LLC
 - c. Overhead Door Corporation
 - d. Wayne Dalton
- B. Operation Cycles: Door components and operators capable of operating for not less than 10,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
- C. Door Curtain Material: Aluminum.
- D. Door Curtain Slats: Flat profile slats of 1-1/4-inch center-to-center height.
- E. Bottom Bar: Manufacturer's standard continuous channel or tubular shape, fabricated aluminum extrusion and finished to match door.
- F. Curtain Jamb Guides: Steel with exposed finish matching curtain slats.
- G. Hood: Match curtain material and finish.
 - 1. Shape: Round.
 - 2. Mounting: Face of wall.

- H. Sill Configuration: No sill.
- I. Locking Devices: Equip door with slide bolt for padlock.
- J. Manual Door Operator: Push-up operation.
 - 1. Provide operator with manufacturer's standard removable operating arm.
- K. Door Finish:
 - 1. Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.
 - 2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.3 COUNTERBALANCE MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- D. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 ALUMINUM FINISHES

- A. Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION, GENERAL

- A. Install coiling counter doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.

3.3 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide tight fit around entire perimeter.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain coiling counter doors.

END OF SECTION 08 33 13

SECTION 08 33 23 - OVERHEAD COILING DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Insulated service doors.

- B. Related Requirements:

- 1. Section 05 50 00 "Metal Fabrications" for miscellaneous steel supports, door-opening framing, corner guards, and bollards.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type and size of overhead coiling door and accessory.

- 1. Include construction details, material descriptions, dimensions of individual components, profiles for slats, and finishes.

- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data.

- 1. Include plans, elevations, sections, and mounting details.
 - 2. Include details of equipment assemblies, and indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 - 4. For exterior components, include details of provisions for assembly expansion and contraction and for excluding and draining moisture to the exterior.
 - 5. Show locations of locking devices, and other accessories.

- C. Samples for Initial Selection: Manufacturer's finish charts showing full range of colors and textures available for units with factory-applied finishes.

- 1. Include similar Samples of accessories involving color selection.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Special warranty.
- B. Maintenance Data: For overhead coiling doors to include in maintenance manuals.

1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of doors that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Two years from date of Material Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain overhead coiling doors from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".
- B. Structural Performance, Exterior Doors: Capable of withstanding the following design wind loads:
 - 1. Design Wind Load: As indicated on Drawings .
 - 2. Deflection Limits: Design overhead coiling doors to withstand design wind load without evidencing permanent deformation or disengagement of door components.
- C. Windborne-Debris Impact Resistance: Provide impact-protectiveoverhead coiling doors that pass ASTM E1886 missile-impact and cyclic-pressure tests according to ASTM E1996 for Wind Zone 2 for enhanced protection.
 - 1. Large-Missile Test: For overhead coiling doors located within 30 ft. of grade.

2.3 DOOR ASSEMBLY

- A. Insulated Service Door: Overhead coiling door formed with curtain of interlocking metal slats.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following
 - a. Clopay Corporation
 - b. CornellCookson, LLC
 - c. Overhead Door Corporation
 - d. Wayne Dalton
- B. Operation Cycles: Door components and operators capable of operating for not less than 10,000. One operation cycle is complete when a door is opened from the closed position to the fully open position and returned to the closed position.
- C. Air Infiltration: Maximum rate of 0.4 cfm/sq. ft. at 15 and 25 mph when tested according to ASTM E283.
- D. Insulated Door Curtain R-Value: 4.5 deg F x h x sq. ft./Btu.
- E. Door Curtain Material: Aluminum.
- F. Door Curtain Slats: Flat profile slats of 3-1/4-inch center-to-center height.
1. Insulated-Slat Interior Facing: Metal.
 2. Gasket Seal. Manufacturer's standard continuous gaskets between slats.
- G. Bottom Bar: Two angles, each not less than 1-1/2 by 1-1/2 by 1/8 inch thick; fabricated from aluminum extrusions and finished to match door.
- H. Curtain Jamb Guides: Aluminum with exposed finish matching curtain slats.
- I. Hood: Match curtain material and finish.
1. Shape: Round.
 2. Mounting: Face of wall.
- J. Locking Devices: Equip door with locking device assembly.
1. Locking Device Assembly: Single-jamb side locking bars, operable from inside and outside with cylinders.
- K. Manual Door Operator: Manufacturer's standard crank operator.
1. Provide operator with through-wall shaft operation.
 2. Provide operator with manufacturer's standard removable operating arm.
- L. Door Finish:

1. Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.
2. Interior Curtain-Slat Facing: Match finish of exterior curtain-slat face.

2.4 LOCKING DEVICES

- A. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
1. Lock Cylinders: As standard with manufacturer and keyed to building keying system.
 2. Keys: Two for each cylinder.

2.5 CURTAIN ACCESSORIES

- A. Weatherseals for Exterior Doors: Equip each exterior door with weather-stripping gaskets fitted to entire exterior perimeter of door for a weather-resistant installation unless otherwise indicated.
1. At door head, use 1/8-inch-thick, replaceable, continuous-sheet baffle secured to inside of hood or field-installed on the header.
 2. At door jambs, use replaceable, adjustable, continuous, flexible, 1/8-inch-thick seals of flexible vinyl, rubber, or neoprene.

2.6 COUNTERBALANCE MECHANISM

- A. General: Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed bearings or self-lubricating graphite bearings for rotating members.
- B. Counterbalance Barrel: Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, seamless or welded carbon-steel pipe, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 in./ft. of span under full load.
- C. Torsion Rod for Counterbalance Shaft: Fabricate of manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.
- D. Brackets: Manufacturer's standard mounting brackets of either cast iron or cold-rolled steel plate.

2.7 MANUAL DOOR OPERATORS

- A. General: Equip door with manual door operator by door manufacturer.

- B. Push-up Door Operation: Lift handles and pull rope for raising and lowering doors, with counterbalance mechanism designed so that required lift or pull for door operation does not exceed 25 lbf.

2.8 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.9 ALUMINUM FINISHES

- A. Powder-Coat Finish: AAMA 2603. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION, GENERAL

- A. Install overhead coiling doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling doors, hoods, and operators at the mounting locations indicated for each door.
- C. Accessibility: Install overhead coiling doors along accessible routes in compliance with the accessibility standard.

3.3 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
 - 1. Adjust exterior doors and components to be weather resistant.

- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust seals to provide tight fit around entire perimeter.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling doors.

END OF SECTION 08 33 23

SECTION 08 41 13 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Aluminum-framed storefront systems (interior).
 - 2. Aluminum-framed pre-glazed hurricane impact window wall system (exterior).
 - 3. Aluminum-framed entrance door systems.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
 - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
 - 2. Include full-size isometric details of each type of vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.
 - d. Glazing.
 - e. Flashing and drainage.
 - 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
 - 4. Include point-to-point wiring diagrams showing the following:

- a. Power requirements for each electrically operated door hardware.
 - b. Location and types of switches, signal device, conduit sizes, and number and size of wires.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- E. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.
- F. Delegated-Design Submittal: For aluminum-framed entrances and storefronts including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data:
- 1. For Installer.
- B. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.
- 1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.
- C. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by a qualified testing agency.
- D. Sample Warranties: For special warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated

by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Design Professional, except with Design Professional's approval. If changes are proposed, submit comprehensive explanatory data to Design Professional for review.

1.8 MOCKUPS

- A. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 1. Testing shall be performed on mockups according to requirements in "Field Quality Control" Article.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Design Professional specifically approves such deviations in writing.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on field mockups.
 1. Build preconstruction field mockups on site; use personnel, products, and methods of construction that will be used at Project site.
 2. Size and Configuration: As indicated by Design Professional.
 3. Notify Design Professional seven days in advance of the dates and times when preconstruction laboratory mockups will be constructed and tested.
- B. Preconstruction Laboratory Mockup Testing: Test preconstruction laboratory mockups according to requirements in "Performance Requirements" Article. Perform the following tests in the following order:
 1. Structural: ASTM E330/E330M at 50 percent of positive test load.
 2. Air Leakage: ASTM E283.
 3. Water Penetration under Static Pressure: ASTM E331.
 4. Water Penetration under Dynamic Pressure: AAMA 501.1.
 5. Structural: ASTM E330/E330M at 100 percent of positive and negative test loads. Repeat the following:
 - a. Air Leakage: ASTM E283.
 - b. Water Penetration under Static Pressure: ASTM E331.
 6. Thermal Cycling: According to AAMA 501.5. Repeat the following:
 - a. Air Leakage: ASTM E283.
 - b. Water Penetration under Static Pressure: ASTM E331.

7. Structural: ASTM E330/E330M at 100 and 150 percent of positive and negative test loads. Repeat the following:

- a. Air Leakage: ASTM E283.
- b. Water Penetration under Static Pressure: ASTM E331.

C. Preconstruction Adhesion and Compatibility Testing: Submit to structural glazing sealant manufacturer, for testing indicated below, Samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that is in close proximity to or is touching the structural or nonstructural sealants of a structural glazed system.

1. Compatibility: Test materials or components using ASTM C1087.
2. Adhesion: Test for adhesion or lack of adhesion of a structural sealant to the surface of another material or component using ASTM C1135.
3. Submit no fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
6. Testing will not be required if data based on previous testing of current sealant products match those submitted.

1.10 WARRANTY

A. Special Warranty: Manufacturer or Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures, including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
2. Warranty Period: Five years from date of Material Completion.

B. Special Finish Warranty, Factory-Applied Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, or peeling.

2. Warranty Period: 10 years from date of Material Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- B. Structural Loads:
 1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
- C. Deflection of Framing Members: At design wind pressure, as follows:
 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
 - a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
- D. Water Penetration under Static Pressure: Test according to ASTM E331 as follows:

-
1. No evidence of water penetration through fixed glazing and framing areas, including entrance doors, when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft..
- E. Water Penetration under Dynamic Pressure: Test according to AAMA 501.1 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft..
 2. Maximum Water Leakage: According to AAMA 501.1. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
- F. Seismic Performance: Aluminum-framed entrances and storefronts shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- G. Energy Performance: Certified and labeled by manufacturer for energy performance. See Section 08 80 00 Glazing for system performance values.:
1. Air Leakage:
 - a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft. when tested according to ASTM E283.
 - b. Entrance Doors: Air leakage of not more than 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
 2. Condensation Resistance Factor (CRF):
 - a. Fixed Glazing and Framing Areas: CRF for the system of not less than 35 as determined according to AAMA 1503.
 - b. Entrance Doors: CRF of not less than 57 as determined according to AAMA 1503.
- H. Windborne-Debris Impact Resistance: Passes ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 2 for enhanced protection.
1. Large-Missile Test: For glazing located within 30 feet of grade.
 2. Small-Missile Test: For glazing located between 30 feet and above grade.
- I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- 2.3 STOREFRONT SYSTEMS
- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. EFCO Corporation.

2. Kawneer North America.
 3. Vistawall International
 4. YKK AP America (Basis of design = YKK YHS 50 TU; YKK YES 40 FS)
- B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Exterior Framing Construction: Thermally broken.
 2. Interior Vestibule Framing Construction: Nonthermal.
 3. Glazing System: Retained mechanically with gaskets on four sides.
 4. Glazing Plane: Center.
 5. Finish: Clear anodic finish.
 6. Fabrication Method: Field-fabricated stick system.
 7. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 8. Steel Reinforcement: As required by manufacturer.
- C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.4 INSULATED SPANDREL PANELS (MP)

1. Laminated, metal-faced flat panels with no deviations in plane exceeding 0.8 percent of panel dimension in width or length.
 - a. Overall Panel Thickness: 1 inch.
 - b. Exterior Skin: Aluminum.
 - 1) Thickness: Manufacturer's standard for finish and texture indicated.
 - 2) Finish: Match framing system.
 - 3) Texture: Smooth.
 - 4) Backing Sheet: 0.125-inch- thick, corrugated, high-density polyethylene.
 - c. Interior Skin: Aluminum.
 - 1) Thickness: Manufacturer's standard for finish and texture indicated.
 - 2) Finish: Matching storefront framing.
 - 3) Texture: Smooth.
 - 4) Backing Sheet: 0.125-inch- thick, corrugated, high-density polyethylene.
 - d. Thermal Insulation Core: Manufacturer's standard rigid, closed-cell, polyisocyanurate board.
 - e. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

- 1) Flame-Spread Index: 25 or less.
- 2) Smoke-Developed Index: 450 or less.

2.5 PRE-GLAZED HURRICANE IMPACT WINDOW WALL SYSTEM

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. EFCO Corporation.
 2. Kawneer North America
 3. Vistawall
 4. YKK AP America (Basis of design = YHW 60 TU).
- B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Exterior Vestibule Framing Construction: Thermally broken.
 2. Glazing System: Retained mechanically with gaskets on four sides.
 3. Glazing Plane: Front.
 4. Finish: Clear anodic finish.
 5. Fabrication Method: Field-fabricated stick system.
 6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 7. Steel Reinforcement: As required by manufacturer.
- C. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

2.6 ENTRANCE DOOR SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. EFCO Corporation.
 2. Kawneer North America.
 3. Vistawall International
 4. YKK AP America (Basis of design = YKK AP Series 50D Standard Entrance).
- B. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing or automatic operation.
1. Door Construction: 2-inch overall thickness, with minimum 0.188-inch- thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.

2. Door Design: Wide stile; 5-inch nominal width.
3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide nonremovable glazing stops on outside of door.
4. Finish: Match adjacent storefront framing finish.

2.7 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 08 71 00 "Door Hardware."
- B. General: Provide entrance door hardware and entrance door hardware sets indicated in door and frame schedule for each entrance door, to comply with requirements in this Section.
 1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products.
 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
 3. Opening-Force Requirements:
 - a. Egress Doors: Not more than 15 lbf to release the latch and not more than 30 lbf to set the door in motion.
 - b. Accessible Interior Doors: Not more than 5 lbf to fully open door.
- C. Designations: Requirements for design, grade, function, finish, quantity, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.
 2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.
- D. Continuous-Gear Hinges: BHMA A156.26.
- E. Weather Stripping: Manufacturer's standard replaceable components.
 1. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- F. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- G. Thresholds: BHMA A156.21 raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch.

2.8 GLAZING

- A. Glazing: Comply with Section 08 80 00 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Glazing Sealants: As recommended by manufacturer.

2.9 MATERIALS

- A. Sheet and Plate: ASTM B209.
- B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
- C. Extruded Structural Pipe and Tubes: ASTM B429/B429M.
- D. Structural Profiles: ASTM B308/B308M.
- E. Steel Reinforcement:
 - 1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
 - 2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
 - 3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.
- F. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

2.10 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
- B. Concealed Flashing:.
- C. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.

2.11 FABRICATION

- A. Form or extrude aluminum shapes before finishing.

- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Provisions for field replacement of glazing from exterior.
 - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Storefront Framing: Fabricate components for assembly using screw-spline system.
- E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
 - 1. At interior and exterior doors, provide compression weather stripping at fixed stops.
- F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
 - 1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
 - 2. At exterior doors, provide weather sweeps applied to door bottoms.
- G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.12 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions.
- B. Do not install damaged components.
- C. Fit joints to produce hairline joints free of burrs and distortion.
- D. Rigidly secure nonmovement joints.
- E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- F. Seal perimeter and other joints watertight unless otherwise indicated.
- G. Metal Protection:
 - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
 - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- H. Set continuous sill members and flashing in full sealant bed, as specified in Section 07 92 00 "Joint Sealants," to produce weathertight installation.
- I. Install joint filler behind sealant as recommended by sealant manufacturer.
- J. Install components plumb and true in alignment with established lines and grades.

3.3 INSTALLATION OF GLAZING

- A. Install glazing as specified in Section 08 80 00 "Glazing."

3.4 INSTALLATION OF WEATHERSEAL SEALANT

- A. After structural sealant has completely cured, remove temporary retainers and insert backer rod between lites of glass as recommended by sealant manufacturer.
- B. Install weatherseal sealant to completely fill cavity, according to sealant manufacturer's written instructions, to produce weatherproof joints.

3.5 INSTALLATION OF ALUMINUM-FRAMED ENTRANCE DOORS

- A. Install entrance doors to produce smooth operation and tight fit at contact points.
 - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.

2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.6 ERECTION TOLERANCES

- A. Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections. Owner has the option to chose testing agency for air leakage and water penetration tests.
- B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.
 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Design Professional shall be tested according to AAMA 501.2 and shall not evidence water penetration.
 - a. Perform a minimum of two tests in areas as directed by Design Professional.
 - b. Perform tests in each test area as directed by Design Professional. Perform at least three tests, prior to 10, 35, and 70 percent completion.
 2. Air Leakage: ASTM E783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
 - a. Perform tests in each test area as directed by Design Professional. Perform at least three tests, prior to 10, 35, and 70 percent completion.
 3. Water Penetration: ASTM E1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory

testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and shall not evidence water penetration.

- C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.8 MAINTENANCE SERVICE

- A. Entrance Door Hardware Maintenance:
 - 1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
 - 2. Initial Maintenance Service: Beginning at Material Completion, provide six months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

END OF SECTION 08 41 13

SECTION 08 44 13 - GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Glazed aluminum curtain wall systems.
 - a. Conventionally glazed.

B. Related Requirements:

- 1. Section 07 92 00 "Joint Sealants" for installation of joint sealants installed with glazed aluminum curtain walls and for sealants to the extent not specified in this Section.
- 2. Section 08 80 00 "Glazing" for curtain wall glazing.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.

- 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
- 2. Include full-size isometric details of each type of vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:
 - a. Joinery, including concealed welds.
 - b. Anchorage.
 - c. Expansion provisions.

- d. Glazing.
 - e. Flashing and drainage.
3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data:
- 1. For Installer.
- B. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components from manufacturer.
- 1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.
- C. Product Test Reports: For glazed aluminum curtain walls, for tests performed by a qualified testing agency.
- D. Sample Warranties: For special warranties.
- 1.6 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.
- 1.7 QUALITY ASSURANCE
- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
- 1. Do not change intended aesthetic effects, as judged solely by Design Professional, except with Design Professional's approval. If changes are proposed, submit comprehensive explanatory data to Design Professional for review.

1.8 MOCKUPS

- A. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
1. Build mockup of typical wall area as directed by Design Professional.
 2. Testing shall be performed on mockups in accordance with requirements in "Field Quality Control" Article.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Owner will engage a qualified testing agency to perform preconstruction testing on laboratory mockups.
1. Build preconstruction laboratory mockups at testing agency facility; use personnel, products, and methods of construction that will be used at Project site.
 2. Size and Configuration: As indicated on Drawings.
 3. Notify Design Professional days in advance of the dates and times when preconstruction laboratory mockups will be constructed and tested.
- B. Preconstruction Mockup Testing: Test preconstruction mockups according to requirements in "Performance Requirements" Article. Perform the following tests in the following order:
1. Structural: ASTM E330/E330M at 50 percent of positive test load.
 2. Air Leakage: ASTM E283.
 3. Water Penetration under Static Pressure: ASTM E331.
 4. Water Penetration under Dynamic Pressure: AAMA 501.1.
 5. Structural: ASTM E330/E330M at 100 percent of positive and negative test loads. Repeat the following:
 - a. Air Leakage: ASTM E283.
 - b. Water Penetration under Static Pressure: ASTM E331.
 6. Interstory Drift: AAMA 501.4 at 100 percent of design displacement. Repeat the following:
 - a. Air Leakage: ASTM E283.
 - b. Water Penetration under Static Pressure: ASTM E331.
 7. Vertical Interstory Movement: AAMA 501.7. Repeat the following:
 - a. Air Leakage: ASTM E283.
 - b. Water Penetration under Static Pressure: ASTM E331.

8. Thermal Cycling: In accordance with AAMA 501.5. Repeat the following:
 - a. Air Leakage: ASTM E283.
 - b. Water Penetration under Static Pressure: ASTM E331.
9. Structural: ASTM E330/E330M at 100 and 150 percent of positive and negative test loads. Repeat the following:
 - a. Air Leakage: ASTM E283.
 - b. Water Penetration under Static Pressure: ASTM E331.

C. Preconstruction Adhesion and Compatibility Testing: Submit to structural glazing sealant manufacturer, for testing indicated below, Samples of each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member that is in close proximity to or is touching the structural or nonstructural sealants of a structural glazed system.

1. Compatibility: Test materials or components using ASTM C1087.
2. Adhesion: Test for adhesion or lack of adhesion of a structural sealant to the surface of another material or component using ASTM C1135.
3. Submit no fewer than eight pieces of each type of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
5. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
6. Testing will not be required if data based on previous testing of current sealant products match those submitted.

1.10 WARRANTY

A. Special Assembly Warranty: Manufacturer or [Installer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
2. Warranty Period: Five years from date of Material Completion.

B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.

1. Deterioration includes, but is not limited to, the following:

- a. Color fading more than 5 Delta E units when tested in accordance with ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested in accordance with ASTM D4214.
 - c. Cracking, peeling, or chipping.
2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design glazed aluminum curtain walls.
- B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 1. Glazed aluminum curtain walls shall withstand movements of supporting structure, including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- C. Structural Loads:
 1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
- D. Deflection of Framing Members: At design wind pressure, as follows:
 1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch, whichever is smaller.
 - a. Operable Units: Provide a minimum 1/16-inch clearance between framing members and operable units.
 3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:

- a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4-inch for spans of greater than 11 feet 8-1/4 inches or 1/175 times span, for spans of less than 11 feet 8-1/4 inches.
- E. Water Penetration under Static Pressure: Test in accordance with ASTM E331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested in accordance with a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft..
- F. Water Penetration under Dynamic Pressure: Test in accordance with AAMA 501.1 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested at dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft..
 2. Maximum Water Leakage: In accordance with AAMA 501.1. Water leakage does not include water controlled by flashing and gutters or water that is drained to exterior.
- G. Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.
1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested in accordance with AAMA 501.6 at design displacement and 1.5 times the design displacement.
 2. Vertical Interstory Movement: Complying with criteria for passing based on building occupancy type when tested in accordance with AAMA 501.7 at design displacement and 1.5 times the design displacement.
- H. Energy Performance: Certified and labelled by manufacturer for energy performance. See Section 08 80 00 Glazing for system performance values.
1. Air Leakage:
 - a. Fixed Glazing and Framing Areas: Air leakage for the system of not more than 0.06 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft. when tested in accordance with ASTM E283.
 2. Condensation Resistance Factor (CRF):
 - a. Fixed Glazing and Framing Areas: CRF for the system of not less than 29 as determined in accordance with AAMA 1503.
- I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SOURCE LIMITATIONS

- A. Obtain all components of curtain-wall system, including framing spandrel panels, entrances and accessories, from single manufacturer.

2.3 GLAZED ALUMINUM CURTAIN WALL SYSTEMS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. EFCO Corporation.
2. Kawneer North America.
3. Vistawall International
4. YKK AP America (Basis of design = YKK YCW 750 OG)

- B. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally improved.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.
4. Finish: Clear anodic finish.
5. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
6. Steel Reinforcement: As required by manufacturer.

- C. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.

1. Include snap-on aluminum trim that conceals fasteners.

- D. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

- E. Insulated Spandrel Panels:

1. Laminated, metal-faced flat panels with no deviations in plane exceeding 0.8 percent of panel dimension in width or length.

- a. Overall Panel Thickness: 1 inch.
- b. Exterior Skin: Aluminum.

- 1) Thickness: Manufacturer's standard for finish and texture indicated.
- 2) Finish: Match framing system.
- 3) Texture: Smooth.
- 4) Backing Sheet: 0.125-inch- thick, corrugated, high-density polyethylene.

- c. Interior Skin: Aluminum.

- 1) Thickness: Manufacturer's standard for finish and texture indicated.

- 2) Finish: Matching curtain-wall framing.
 - 3) Texture: Smooth.
 - 4) Backing Sheet: 0.125-inch- thick, corrugated, high-density polyethylene.
- d. Thermal Insulation Core: Manufacturer's standard rigid, closed-cell, polyisocyanurate board.
 - e. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1) Flame-Spread Index: 25 or less.
 - 2) Smoke-Developed Index: 450 or less.
- F. Entrance Door Systems: Comply with Section 08 41 13 "Aluminum-Framed Entrances and Storefronts".

2.4 GLAZING

- A. Glazing: Comply with Section 08 80 00 "Glazing."
- B. Weatherseal Sealants: ASTM C920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes into contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed curtain-wall manufacturers for this use.

2.5 MATERIALS

- A. Sheet and Plate: ASTM B209.
- B. Extruded Bars, Rods, Profiles, and Tubes: ASTM B221.
- C. Extruded Structural Pipe and Tubes: ASTM B429/B429M.
- D. Structural Profiles: ASTM B308/B308M.
- E. Steel Reinforcement:
 1. Structural Shapes, Plates, and Bars: ASTM A36/A36M.
 2. Cold-Rolled Sheet and Strip: ASTM A1008/A1008M.
 3. Hot-Rolled Sheet and Strip: ASTM A1011/A1011M.
- F. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods in accordance with recommendations in SSPC-SP COM, and prepare surfaces in accordance with applicable SSPC standard.

2.6 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A123/A123M or ASTM A153/A153M requirements.
- C. Concealed Flashing:.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.

2.7 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Physical and thermal isolation of glazing from framing members.
 - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
 - 5. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Fabricate components to resist water penetration as follows:
 - 1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
 - 2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.

- E. Curtain-Wall Framing: Fabricate components for assembly using manufacturer's standard assembly method.
- F. Factory-Assembled Frame Units:
 - 1. Rigidly secure nonmovement joints.
 - 2. Prepare surfaces that are in contact with structural sealant in accordance with sealant manufacturer's written instructions, to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
 - 3. Seal joints watertight unless otherwise indicated.
 - 4. Install glazing to comply with requirements in Section 08 80 00 "Glazing."
- G. After fabrication, clearly mark components to identify their locations in Project in accordance with Shop Drawings.

2.8 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions.
- B. Do not install damaged components.
- C. Fit joints to produce hairline joints free of burrs and distortion.
- D. Rigidly secure nonmovement joints.
- E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- F. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
- G. Seal joints watertight unless otherwise indicated.
- H. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- I. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
 - J. Install components plumb and true in alignment with established lines and grades.

3.3 INSTALLATION OF GLAZING

- A. Install glazing as specified in Section 08 80 00 "Glazing."

3.4 INSTALLATION OF WEATHERSEAL SEALANT

- A. Install weatherseal sealant to completely fill cavity, in accordance with sealant manufacturer's written instructions, to produce weatherproof joints.

3.5 ERECTION TOLERANCES

- A. Install glazed aluminum curtain walls to comply with the following maximum tolerances:
 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections. Owner has the option to chose testing agency for air leakage and water penetration tests.
- B. Test Area: Perform tests on representative areas of glazed aluminum curtain walls.
- C. Field Quality-Control Testing: Perform the following test on representative areas of glazed aluminum curtain walls.

1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Design Professional shall be tested in accordance with AAMA 501.2 and shall not evidence water penetration.
 - a. Perform a minimum of two tests in areas as directed by Design Professional.
 - b. Perform tests in each test area as directed by Design Professional. Perform at least three tests, prior to 10, 35, and 70 percent completion.
 2. Air Leakage: ASTM E783 at 1.5 times the rate specified for laboratory testing in "Performance Requirements" Article but not more than 0.09 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft..
 - a. Perform tests in each test area as directed by Design Professional. Perform at least three tests, prior to 10, 35, and 70 percent completion.
 3. Water Penetration: ASTM E1105 at a minimum uniform and cyclic static-air-pressure differential of 0.67 times the static-air-pressure differential specified for laboratory testing in "Performance Requirements" Article, but not less than 6.24 lbf/sq. ft., and shall not evidence water penetration.
- D. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.
- E. Prepare test and inspection reports.

END OF SECTION 08 44 13

SECTION 08 51 13 - ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes aluminum windows for exterior locations.
- B. Related Requirements:
 - 1. Section 08 88 13 "Fire-Rated Glazing" for glazing types in fire-rated windows.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review and discuss the finishing of aluminum windows that is required to be coordinated with the finishing of other aluminum work for color and finish matching.
 - 3. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for anchoring, flashing, weeping, sealing perimeters, and protecting finishes.
 - 4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
 - 5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
- B. Shop Drawings: For aluminum windows.
 - 1. Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.

- C. Samples: For each exposed product and for each color specified, 2 by 4 inches in size.
- D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Product Test Reports: For each type of aluminum window, for tests performed by a qualified testing agency.
- C. Field quality-control reports.
- D. Sample Warranties: For manufacturer's warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.

1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
 - c. Faulty operation of movable sash and hardware.
 - d. Deterioration of materials and finishes beyond normal weathering.
 - e. Failure of insulating glass.
 - 2. Warranty Period:
 - a. Window: 10 years from date of Material Completion.
 - b. Glazing Units: 10 years from date of Material Completion.
 - c. Aluminum Finish: 10 years from date of Material Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.
 - 1. Window Certification: AAMA certified with label attached to each window.
- B. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 45.
- C. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F ambient; 180 deg F material surfaces.
- D. Sound Transmission Class (STC): Rated for not less than 26 STC when tested for laboratory sound transmission loss according to ASTM E90 and determined by ASTM E413.

2.3 ALUMINUM WINDOWS

- A. Types: Provide the following types in locations indicated on Drawings:
 - 1. Horizontal sliding.
- B. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
 - 1. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.
- C. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.
 - 1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.
- D. Horizontal-Sliding Window Hardware:
 - 1. Sill Cap/Track: Extruded-aluminum track with natural anodized finish of dimensions and profile indicated; designed to comply with performance requirements indicated and to drain to the exterior.

2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only. Provide key-operated custodial locks.
 3. Roller Assemblies: Low-friction design.
- E. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
- F. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
1. Exposed Fasteners: Do not use exposed fasteners to greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.

2.4 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Glaze aluminum windows in the factory.
- C. Weather strip each operable sash to provide weathertight installation.
- D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

- B. Class I, Color Anodic Finish: AA-M12C22A42/A44 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, integrally colored or electrolytically deposited color coating 0.018 mm or thicker) complying with AAMA 611.
 - 1. Color: As selected by Architect from full range of industry colors and color densities.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E2112.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections. Owner has the option to chose testing agency for air leakage and water penetration tests.
 - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.

- B. Testing Services: Testing and inspecting of installed windows shall take place as follows:
1. Testing Methodology: Testing of windows for air infiltration and water resistance shall be performed according to AAMA 502.
 2. Air-Infiltration Testing:
 - a. Test Pressure: That required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance class indicated.
 - b. Allowable Air-Leakage Rate: 1.5 times the applicable AAMA/WDMA/CSA 101/I.S.2/A440 rate for product type and performance class rounded down to one decimal place.
 3. Water-Resistance Testing:
 - a. Test Pressure: Two-thirds times test pressure required to determine compliance with AAMA/WDMA/CSA 101/I.S.2/A440 performance grade indicated.
 - b. Allowable Water Infiltration: No water penetration.
 4. Testing Extent: Three windows of each type as selected by Architect and a qualified independent testing and inspecting agency. Windows shall be tested after perimeter sealants have cured.
 5. Test Reports: Prepared according to AAMA 502.
- C. Windows will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
 1. Keep protective films and coverings in place until final cleaning.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 08 51 13

SECTION 08 71 00 – DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes commercial door hardware for the following:
 - 1. Swinging doors.
 - 2. Sliding doors.
 - 3. Other doors to the extent indicated.
- B. Door hardware includes, but is not necessarily limited to, the following:
 - 1. Mechanical door hardware.
 - 2. Electromechanical door hardware.
 - 3. Cylinders specified for doors in other sections.
- C. Related Sections:
 - 1. Division 08 Section “Hollow Metal Doors and Frames”.
 - 2. Division 08 Section “Interior Aluminum Doors and Frames”.
 - 3. Division 08 Section “Flush Wood Doors”.
 - 4. Division 08 Section “Aluminum-Framed Entrances and Storefronts”.
 - 5. Division 08 Section “All-Glass Entrances”.
 - 6. Division 26 Section “Electrical”.
 - 7. Division 28 Section “Electronic Safety and Security”.
- D. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction.
 - 1. ANSI A117.1 - Accessible and Usable Buildings and Facilities.
 - 2. ICC/IBC - International Building Code.
 - 3. NFPA 70 - National Electrical Code.
 - 4. NFPA 80 - Fire Doors and Windows.
 - 5. NFPA 101 - Life Safety Code.
 - 6. NFPA 105 - Installation of Smoke Door Assemblies.
 - 7. State Building Codes, Local Amendments.

- E. Standards: All hardware specified herein shall comply with the following industry standards as applicable. Any undated reference to a standard shall be interpreted as referring to the latest edition of that standard:
1. ANSI/BHMA Certified Product Standards - A156 Series.
 2. UL10C – Positive Pressure Fire Tests of Door Assemblies.
 3. ANSI/UL 294 – Access Control System Units.

1.3 QUALITY ASSURANCE

- A. Manufacturers Qualifications: Engage qualified manufacturers with a minimum 5 years of documented experience in producing hardware and equipment similar to that indicated for this Project and that have a proven record of successful in-service performance.
- B. Certified Products: Where specified, products must maintain a current listing in the Builders Hardware Manufacturers Association (BHMA) Certified Products Directory (CPD).
- C. Installer Qualifications: A minimum 10 years documented experience installing both standard and electrified door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- D. Door Hardware Supplier Qualifications: Experienced commercial door hardware distributors with a minimum 25 years documented experience supplying both mechanical and electromechanical hardware installations comparable in material, design, and extent to that indicated for this Project. Supplier recognized as a factory direct distributor by the manufacturers of the primary materials with a warehousing facility in Project's vicinity. Supplier to have on staff a certified Architectural Hardware Consultant (AHC) available during the course of the Work to consult with Contractor, Architect, and Owner concerning both standard and electromechanical door hardware and keying.
- E. Integrated Wiegand, Wireless, and IP-Enabled Access Control Products Supplier Qualifications: Integrated access control products and accessories are required to be supplied and installed through current members of the ASSA ABLOY "Authorized Channel Partner" (ACP) and "Certified Integrator" (CI) programs. Suppliers are to be factory trained, certified prior to project bid, and a direct purchaser of the specified product. Installers are to be factory trained, certified prior to project bid, and are responsible for commissioning, servicing, and warranting the installed equipment specified for the project.
- F. Source Limitations: Obtain each type and variety of door hardware specified in this section from a single source unless otherwise indicated.
1. Electrified modifications or enhancements made to a source manufacturer's product line by a secondary or third party source will not be accepted.
 2. Provide electromechanical door hardware from the same manufacturer as mechanical door hardware, unless otherwise indicated.
- G. Each unit to bear third party permanent label demonstrating compliance with the referenced standards.

- H. Keying Conference: Conduct conference to comply with requirements in Division 01 Section "Project Meetings." Keying conference to incorporate the following criteria into the final keying schedule document:
1. Function of building, purpose of each area and degree of security required.
 2. Plans for existing and future key system expansion.
 3. Requirements for key control storage and software.
 4. Installation of permanent keys, cylinder cores and software.
 5. Address and requirements for delivery of keys.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.
- B. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.
- C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the "Keying Conference".

1.5 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrified hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.
- B. Door Hardware and Electrical Connections: Coordinate the layout and installation of scheduled electrified door hardware and related access control equipment with required connections to source power junction boxes, low voltage power supplies, detection and monitoring hardware, and fire and detection alarm systems.
- C. Door and Frame Preparation: Doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

1.6 WARRANTY

- A. General Warranty: Reference Division 01, General Requirements. Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. Warranty Period: Written warranty, executed by manufacturer(s), agreeing to repair or replace components of standard and electrified door hardware that fails in materials or workmanship within specified warranty period after final acceptance by the Owner. Failures include, but are not limited to, the following:
1. Structural failures including excessive deflection, cracking, or breakage.
 2. Faulty operation of the hardware.
 3. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 4. Electrical component defects and failures within the systems operation.
- C. Standard Warranty Period: One year from date of Substantial Completion, unless otherwise indicated.
- D. Special Warranty Periods:
1. Ten years for mortise locks and latches.
 2. Five years for exit hardware.
 3. Ten years for manual overhead door closer bodies.
 4. Five years for motorized electric latch retraction exit devices.
 5. Two years for electromechanical door hardware.

1.7 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in Door Hardware Sets and each referenced section that products are to be supplied under.
- B. Designations: Requirements for quantity, item, size, finish or color, grade, function, and other distinctive qualities of each type of door hardware are indicated in the Door Hardware Sets at the end of Part 3. Products are identified by using door hardware designations, as follows:
1. Named Manufacturer's Products: Product designation and manufacturer are listed for each door hardware type required for the purpose of establishing requirements. Manufacturers' names are abbreviated in the Door Hardware Schedule.
- C. Substitutions: Only those manufacturers shown for the associated products are approved for inclusion on this project.

2.2 HANGING DEVICES

- A. Hinges: ANSI/BHMA A156.1 certified butt hinges with number of hinge knuckles and other options as specified in the Door Hardware Sets.
1. Quantity: Provide the following hinge quantity:
 2. Two Hinges: For doors with heights up to 60 inches
Three Hinges: For doors with heights 61 to 90 inches
Four Hinges: For doors with heights 91 to 120 inches
For doors with heights more than 120 inches provide 4 hinges, plus 1 hinge for every 30 inches of door height greater than 120 inches
Hinge Size: Provide the following, unless otherwise indicated, with hinge widths sized for door thickness and clearances required:
 - a. Widths up to 3'6": 4-1/2" standard or heavy weight as specified.
 - b. Sizes from 3'7" to 4'0": 5" standard or heavy weight as specified.
 3. Hinge Weight and Base Material: Unless otherwise indicated, provide the following:
 - a. Exterior Doors: Heavy weight, non-ferrous, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate standard weight.
 - b. Interior Doors: Standard weight, steel, ball bearing or oil impregnated bearing hinges unless Hardware Sets indicate heavy weight.
 4. Hinge Options: Comply with the following:
 - a. Non-removable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for the all out-swinging lockable doors.
 5. Manufacturers:
 - a. Hager Companies (HA).
 - b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK).
 - c. Stanley Hardware (ST).

2.3 POWER TRANSFER DEVICES

- A. Electrified Quick Connect Transfer Hinges: Provide electrified transfer hinges with Molex™ standardized plug connectors and sufficient number of concealed wires (up to 12) to accommodate the electrified functions specified in the Door Hardware Sets. Connectors plug directly to through-door wiring harnesses for connection to electric locking devices and power supplies. Wire nut connections are not acceptable.
1. Manufacturers:
 - a. Hager Companies (HA) - ETW-QC (# wires) Option.
 - b. McKinney Products; ASSA ABLOY Architectural Door Accessories (MK) - QC (# wires) Option.
 - c. Stanley Hardware (ST) – C Option.

2.4 DOOR AND FRAME CABLES

- A. Door and frame cables shall match the McKinney ElectroLynx Molexed cabling products. These cables shall be provided as follows:
1. Door Cables: SCCPSS plug-n-play Molex connectors compatible with the campus system. (12) twelve conductor cables shall be provided in the following colored conductors: Black, Red, White, Green, Orange, Blue, Brown, Yellow, Violet, Grey, Pink, Tan. All conductors shall be 20AWG. Each conductor shall have its own colored jacket with the bundle be wrapped by an outer jacket.
 2. Frame cables for electrified hardware shall be (12) twelve conductor and match the colors listed in #1. Frame cables shall be provided in 75-foot lengths with Molex on the frame egress end. Overhead end shall be flying leads.
 3. Door Position Switch Frame Cables: These cables shall be (2) two conductor 20AWG with an outer jacket. These frame cables shall be provided in 75-foot lengths.
- B. All door and frame cables shall be Plenum rated.

2.5 DOOR OPERATING TRIM

- A. Flush Bolts and Surface Bolts: ANSI/BHMA A156.3 and A156.16, Grade 1, certified.
1. Flush bolts to be furnished with top rod of sufficient length to allow bolt retraction device location approximately six feet from the floor.
 2. Furnish dust proof strikes for bottom bolts.
 3. Surface bolts to be minimum 8" in length and U.L. listed for labeled fire doors and U.L. listed for windstorm components where applicable.
 4. Provide related accessories (mounting brackets, strikes, coordinators, etc.) as required for appropriate installation and operation.
 5. Manufacturers:
 - a. Door Controls International (DC).
 - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
 - c. Trimco (TC).
- B. Door Push Plates and Pulls: ANSI/BHMA A156.6 certified door pushes and pulls of type and design specified in the Hardware Sets. Coordinate and provide proper width and height as required where conflicting hardware dictates.
1. Push/Pull Plates: Minimum .050 inchthick, size as indicated in hardware sets,with beveled edges, secured with exposed screws unless otherwise indicated.
 2. Door Pull and Push Bar Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door unless otherwise indicated.
 3. Offset Pull Design: Size, shape, and material as indicated in the hardware sets. Minimum clearance of 2 1/2-inches from face of door and offset of 90 degrees unless otherwise indicated.
 4. Fasteners: Provide manufacturer's designated fastener type as indicated in Hardware Sets.
 5. Manufacturers:

- a. Hiawatha, Inc. (HI).
- b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
- c. Trimco (TC).

2.6 CYLINDERS AND KEYING

- A. General: Cylinder manufacturer to have minimum (10) years' experience designing secured master key systems and have on record a published security keying system policy.
- B. Source Limitations: Obtain each type of keyed cylinder and keys from the same source manufacturer as locksets and exit devices, unless otherwise indicated.
 1. Manufacturers:
 - a. Sargent Manufacturing (SA).
 - b. No Substitution.
- C. Cylinders: Original manufacturer cylinders complying with the following:
 1. Mortise Type: Threaded cylinders with rings and cams to suit hardware application.
 2. Rim Type: Cylinders with back plate, flat-type vertical or horizontal tailpiece, and raised trim ring.
 3. Bored-Lock Type: Cylinders with tailpieces to suit locks.
 4. Mortise and rim cylinder collars to be solid and recessed to allow the cylinder face to be flush and be free spinning with matching finishes.
 5. Keyway: Match Facility Standard.
- D. Security Cylinders: ANSI/BHMA A156.5, Grade 1, patterned security cylinders and keys able to be used together under the same facility master or grandmaster key system.
 1. Manufacturers:
 - a. Sargent (SA) – Signature.
- E. Keying System: Each type of lock and cylinders to be factory keyed.
 1. Supplier shall conduct a "Keying Conference" to define and document keying system instructions and requirements.
 2. Furnish factory cut, nickel-silver large bow permanently inscribed with a visual key control number as directed by Owner.
 3. Existing System: Field verify and key cylinders to match Owner's existing system.
- F. Key Quantity: Provide the following minimum number of keys:
 1. Change Keys per Cylinder: Two (2)
 2. Master Keys (per Master Key Level/Group): Five (5).
 3. Construction Keys (where required): Ten (10).
- G. Construction Keying: Provide construction master keyed cylinders.

H. Key Registration List (Bitting List):

1. Provide keying transcript list to Owner's representative in the proper format for importing into key control software.
2. Provide transcript list in writing or electronic file as directed by the Owner.

2.7 KEY CONTROL

A. Key Control Cabinet: Provide a key control system including envelopes, labels, and tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet. Key control cabinet shall have expansion capacity of 150% of the number of locks required for the project.

1. Manufacturers:
 - a. Lund Equipment (LU).
 - b. MMF Industries (MM).
 - c. Telkee (TK).

2.8 MECHANICAL LOCKS AND LATCHING DEVICES

A. Mortise Locksets, Grade 1 (Heavy Duty): ANSI/BHMA A156.13, Series 1000, Operational Grade 1 Certified Products Directory (CPD) listed. Locksets are to be manufactured with a corrosion resistant steel case and be field-reversible for handing without disassembly of the lock body.

1. Where specified, provide status indicators with highly reflective color and wording for "locked/unlocked" or "vacant/occupied" with custom wording options if required. Indicator to be located above the cylinder with the inside thumb-turn not blocking the visibility of the indicator status. Indicator window size to be a minimum of 2.1" x 0.6" with a curved design allowing a 180 degree viewing angle with protective covering to prevent tampering.
2. Manufacturers:
 - a. Corbin Russwin Hardware (RU) – ML2000 Series.
 - b. dormakaba Best (BE) – 45H Series.
 - c. Sargent Manufacturing (SA) – 8200 Series.

B. Multi-Point Locksets: Vertical rod locking devices designed for openings requiring multiple latching points within one locking mechanism. Rods are retracted by dual mounted outside lever trim controls available in a variety of ANSI/BHMA operational functions. Option for single top latching only eliminates the need for bottom strikes.

1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) – MP9800 Series.
 - b. Sargent Manufacturing (SA) - 7000 Series.
 - c. Schlage (SC) – LM9200 Series.

2.9 ELECTROMECHANICAL LOCKING DEVICES

- A. Electromechanical Multi-Point Locks: Vertical rod locking devices designed for openings requiring multiple latching points within one locking mechanism. Rods are retracted by dual mounted outside lever trim controls available in a variety of ANSI/BHMA operational functions. Option for single top latching only eliminates the need for bottom strikes. Electromechanical options include solenoid activated trim, electric latch retraction, and inside and outside lever monitoring.
1. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.
 2. Manufacturers:
 - a. Corbin Russwin Hardware (RU) MP9800 Series.
 - b. Sargent Manufacturing (SA) – 7000 Series.

2.10 INTEGRATED WIEGAND OUTPUT ACCESS CONTROL LOCKING DEVICES

- A. Integrated Wiegand Output Mortise Locks: Wiegand output ANSI A156.13, UL294 6th Edition, CAN ULC S319, A156.25 Grade 1, mortise lockset with integrated RFID card reader, request-to-exit signaling, door position status switch, and latchbolt monitoring in one complete unit. Hard wired, motor driven locking/unlocking control of the lever handle trim, 3/4" deadlocking anti-friction latch, and 1" case-hardened steel deadbolt. Lock is U.L listed and labeled for use on up to 3 hour fire rated openings. Available with or without keyed high security cylinder override.
1. Open architecture, hard wired platform supports centralized control of locking units with new or existing Wiegand compatible access control systems. Latchbolt monitoring and door position switch act in conjunction to report door-in-frame (DPS) and door latched (door closed and latched) conditions.
 2. Reader supports either HID 125 kHz proximity (up to 39 bits, including Corporate 1000) or 13.56 MHz iClass®, iClass® SE, iClass® SR, iClass® Seos, MIFARE, DESFire EV1, and Seos NFC mobile credentials (including Elite, University 1000 and Corporate 1000).
 3. 12VDC external power supply required for reader and lock, with optional 24VDC operation available with iClass® reader (125 kHz reader is always 12VDC). Fail safe or fail secure options.
 4. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.
 5. Installation requires only one cable run from the lock to the access control panel without requirements for additional proprietary lock panel interface boards or modules.
 6. Support end-of-line resistors contained within the lock case.
 7. Installation to include manufacturer's access control panel interface board or module where required for Wiegand output protocol.
 8. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - Access 600 - ML20600 RNE1 Series.
 - b. Sargent Manufacturing (SA) - Harmony - H1/H2 8200 Series.
 - c. Stanley Best (BE) - IDH MAX 1300 Series.

2.11 AUXILIARY LOCKS

- A. Mortise Deadlocks, Small Case: ANSI/BHMA A156.36, Grade 1, small case mortise type deadlocks constructed of heavy gauge wrought corrosion resistant steel. Steel or stainless steel bolts with a 1" throw and hardened steel roller pins. Deadlocks to be products of the same source manufacturer and keyway as other specified locksets.

1. Manufacturers:

- a. Corbin Russwin Hardware (RU) - DL4100 Series.
- b. Sargent Manufacturing (SA) - 4870 Series.
- c. Stanley Best (BE) - 48H Series.

2.12 LOCK AND LATCH STRIKES

- A. Strikes: Provide manufacturer's standard strike with strike box for each latch or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, unless otherwise indicated, and as follows:

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Provide manufacturer's special strike box fabricated for aluminum framing.
4. Double-lipped strikes: For locks at double acting doors. Furnish with retractable stop for rescue hardware applications.

- B. Standards: Comply with the following:

1. Strikes for Mortise Locks and Latches: BHMA A156.13.
2. Strikes for Bored Locks and Latches: BHMA A156.2.
3. Strikes for Auxiliary Deadlocks: BHMA A156.36.
4. Dustproof Strikes: BHMA A156.16.

2.13 CONVENTIONAL EXIT DEVICES

- A. General Requirements: All exit devices specified herein shall meet or exceed the following criteria:

1. At doors not requiring a fire rating, provide devices complying with NFPA 101 and listed and labeled for "Panic Hardware" according to UL305. Provide proper fasteners as required by manufacturer including sex nuts and bolts at openings specified in the Hardware Sets.
2. Where exit devices are required on fire rated doors, provide devices complying with NFPA 80 and with UL labeling indicating "Fire Exit Hardware". Provide devices with the proper fasteners for installation as tested and listed by UL. Consult manufacturer's catalog and template book for specific requirements.

3. Except on fire rated doors, provide exit devices with hex key dogging device to hold the pushbar and latch in a retracted position. Provide optional keyed cylinder dogging on devices where specified in Hardware Sets.
 4. Devices must fit flat against the door face with no gap that permits unauthorized dogging of the push bar. The addition of filler strips is required in any case where the door light extends behind the device as in a full glass configuration.
 5. Energy Efficient Design: Provide lock bodies which have a holding current draw of 15mA maximum, and can operate on either 12 or 24 volts. Locks are to be field configurable for fail safe or fail secure operation.
 6. Electromechanical Options: Subject to same compliance standards and requirements as mechanical exit devices, electrified devices to be of type and design as specified in hardware sets. Include any specific controllers when conventional power supplies are not sufficient to provide the proper inrush current.
 7. Motorized Electric Latch Retraction: Devices with an electric latch retraction feature must use motors which have a maximum current draw of 600mA. Solenoid driven latch retraction is not acceptable.
 8. Lever Operating Trim: Where exit devices require lever trim, furnish manufacturer's heavy duty escutcheon trim with threaded studs for thru-bolts.
 - a. Lock Trim Design: As indicated in Hardware Sets, provide finishes and designs to match that of the specified locksets.
 - b. Where function of exit device requires a cylinder, provide a cylinder (Rim or Mortise) as specified in Hardware Sets.
 9. Vertical Rod Exit Devices: Where surface or concealed vertical rod exit devices are used at interior openings, provide as less bottom rod (LBR) unless otherwise indicated. Provide dust proof strikes where thermal pins are required to project into the floor.
 10. Narrow Stile Applications: At doors constructed with narrow stiles, or as specified in Hardware Sets, provide devices designed for maximum 2" wide stiles.
 11. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
 12. Rail Sizing: Provide exit device rails factory sized for proper door width application.
 13. Through Bolt Installation: For exit devices and trim as indicated in Door Hardware Sets.
 14. Hurricane and Tornado Resistance Compliance: Conventional exit devices are to be U.L. listed for windstorm assemblies where applicable. Provide the appropriate hurricane or tornado resistant products that have been independent third party tested, certified, and labeled to meet state and local windstorm building codes applicable to project.
- B. Conventional Push Rail Exit Devices (Heavy Duty): ANSI/BHMA A156.3, Grade 1 Certified Products Directory (CPD) listed panic and fire exit hardware devices furnished in the functions specified in the Hardware Sets. Exit device latch to be stainless steel, pullman type, with deadlock feature.
1. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - ED4000 / ED5000 Series.
 - b. Sargent Manufacturing (SA) - 80 Series.
 - c. Von Duprin (VD) - 35A/98 XP Series.

2.14 INTEGRATED WIEGAND OUTPUT ACCESS CONTROL EXIT DEVICES

- A. Wiegand Output Integrated Card Reader Exit Hardware: Wiegand output ANSI 156.3 Grade 1 rim, mortise, and vertical rod exit device hardware with integrated proximity card reader, latchbolt and touchbar monitoring, and request-to-exit signaling, in one complete unit. Hard wired, solenoid driven locking/unlocking control of the lever handle exit trim with 3/4" throw latch bolt. U.L listed and labeled for either panic or "fire exit hardware" for use on up to 3 hour fire rated openings. Available with or without keyed high security cylinder override.
1. Open architecture, hard wired platform supports centralized control of locking units with new or existing Wiegand compatible access control systems. Inside push bar (request-to-exit) signaling and door position (open/closed status) monitoring (via separately connected DPS).
 2. Reader supports either HID 125 kHz proximity (up to 39 bits, including Corporate 1000) or 13.56 MHz (2K-32K) iClass® credentials.
 3. 12VDC external power supply required for reader, with optional 24VDC operation available with iClass® reader (125 kHz reader is always 12VDC). 24VDC required for solenoid operated exit trim (12VDC if applicable). Fail safe or fail secure options.
 4. Installation requires only one cable run from the exit hardware to the access control panel without requirements for additional proprietary lock panel interface boards or modules.
 5. Manufacturers:
 - a. Corbin Russwin Hardware (RU) - Access 600 - ED5000 RNE1 Series.
 - b. Sargent Manufacturing (SA) - Harmony - H1/H2 80 Series.

2.15 DOOR CLOSERS

- A. All door closers specified herein shall meet or exceed the following criteria:
1. General: Door closers to be from one manufacturer, matching in design and style, with the same type door preparations and templates regardless of application or spring size. Closers to be non-handed with full sized covers.
 2. Standards: Closers to comply with UL-10C for Positive Pressure Fire Test and be U.L. listed for use of fire rated doors.
 3. Size of Units: Comply with manufacturer's written recommendations for sizing of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Where closers are indicated for doors required to be accessible to the Americans with Disabilities Act, provide units complying with ANSI ICC/A117.1.
 4. Closer Arms: Provide heavy duty, forged steel closer arms unless otherwise indicated in Hardware Sets.
 5. Closers shall not be installed on exterior or corridor side of doors; where possible install closers on door for optimum aesthetics.
 6. Closer Accessories: Provide door closer accessories including custom templates, special mounting brackets, spacers and drop plates as required for proper installation. Provide through-bolt and security type fasteners as specified in the hardware sets.
- B. Door Closers, Surface Mounted (Heavy Duty): ANSI/BHMA A156.4, Grade 1 Certified Products Directory (CPD) listed surface mounted, heavy duty door closers with complete spring power adjustment, sizes 1 thru 6; and fully operational adjustable according to door size, frequency of

use, and opening force. Closers to be rack and pinion type, one piece cast iron or aluminum alloy body construction, with adjustable backcheck and separate non-critical valves for closing sweep and latch speed control. Provide non-handed units standard.

1. Manufacturers:
 - a. LCN Closers (LC) – 4040SE Series.
 - b. Norton Door Controls (NO) – 7500 Series.
 - c. Sargent Manufacturing (SA) – 351 Series.

2.16 SURFACE MOUNTED CLOSER HOLDERS

- A. Electromagnetic Door Holders: Certified ANSI A156.15 electromagnetic door holder/releases with a minimum 20 to 40 pounds holding power and single coil construction able to accommodate 12VDC, 24VAC, 24VDC and 120VAC. Coils to be independently wound, employing an integral fuse and armatures to include a positive release button.

1. Manufacturers:
 - a. LCN Door Closers (LC) - SEM7800 Series.
 - b. Rixson (RF) - 980/990 Series.
 - c. Sargent Manufacturing (SA) - 1560 Series.

2.17 ARCHITECTURAL TRIM

- A. Door Protective Trim

1. General: Door protective trim units to be of type and design as specified below or in the Hardware Sets.
2. Size: Fabricate protection plates (kick, armor, or mop) not more than 2" less than door width (LDW) on stop side of single doors and 1" LDW on stop side of pairs of doors, and not more than 1" less than door width on pull side. Coordinate and provide proper width and height as required where conflicting hardware dictates. Height to be as specified in the Hardware Sets.
3. Where plates are applied to fire rated doors with the top of the plate more than 16" above the bottom of the door, provide plates complying with NFPA 80. Consult manufacturer's catalog and template book for specific requirements for size and applications.
4. Protection Plates: ANSI/BHMA A156.6 certified protection plates (kick, armor, or mop), fabricated from the following:
 - a. Stainless Steel: 300 grade, 050-inchthick.
5. Options and fasteners: Provide manufacturer's designated fastener type as specified in the Hardware Sets. Provide countersunk screw holes.
6. Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).

- c. Trimco (TC).

2.18 DOOR STOPS AND HOLDERS

- A. General: Door stops and holders to be of type and design as specified below or in the Hardware Sets.
- B. Door Stops and Bumpers: ANSI/BHMA A156.16, Grade 1 certified door stops and wall bumpers. Provide wall bumpers, either convex or concave types with anchorage as indicated, unless floor or other types of door stops are specified in Hardware Sets. Do not mount floor stops where they will impede traffic. Where floor or wall bumpers are not appropriate, provide overhead type stops and holders.
 1. Manufacturers:
 - a. Hiawatha, Inc. (HI).
 - b. Rockwood Products; ASSA ABLOY Architectural Door Accessories (RO).
 - c. Trimco (TC).
- C. Overhead Door Stops and Holders: ANSI/BHMA A156.8, Grade 1 Certified Products Directory (CPD) listed overhead stops and holders to be surface or concealed types as indicated in Hardware Sets. Track, slide, arm and jamb bracket to be constructed of extruded bronze and shock absorber spring of heavy tempered steel. Provide non-handed design with mounting brackets as required for proper operation and function.
 1. Manufacturers:
 - a. dormakaba (DO).
 - b. Rixson Door Controls (RF).
 - c. Sargent Manufacturing (SA).

2.19 ARCHITECTURAL SEALS

- A. General: Thresholds, weatherstripping, and gasket seals to be of type and design as specified below or in the Hardware Sets. Provide continuous weatherstrip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated. At exterior applications provide non-corrosive fasteners and elsewhere where indicated.
- B. Smoke Labeled Gasketing: Assemblies complying with NFPA 105 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for smoke control ratings indicated, based on testing according to UL 1784.
 1. Provide smoke labeled perimeter gasketing at all smoke labeled openings.
- C. Fire Labeled Gasketing: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to UL-10C.

1. Provide intumescent seals as indicated to meet UL10C Standard for Positive Pressure Fire Tests of Door Assemblies, and NPFA 252, Standard Methods of Fire Tests of Door Assemblies.
- D. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated.
- E. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- F. Manufacturers:
 1. National Guard Products (NG).
 2. Pemko Products; ASSA ABLOY Architectural Door Accessories (PE).
 3. Reese Enterprises, Inc. (RE).

2.20 ELECTRONIC ACCESSORIES

- A. Door Position Switches: Door position magnetic reed contact switches specifically designed for use in commercial door applications. On recessed models the contact and magnetic housing snap-lock into a 1" diameter hole. Surface mounted models include wide gap distance design complete with armored flex cabling. Provide SPDT, N/O switches with optional Rare Earth Magnet installation on steel doors with flush top channels.
 1. Manufacturers:
 - a. Sargent Manufacturing (SA) – 3280 Series.
 - b. Security Door Controls (SD) - DPS Series.
 - c. Securitron (SU) - DPS Series.
- B. Intelligent Switching Power Supplies: Provide power supplies with single, dual or multi-voltage configurations at 12 and/or 24VDC. Power Supply shall have battery backup function with an integrated battery charging circuit. The power supply shall have a standard, integrated Fire Alarm Interface (FAI). The power supply shall provide capability for secondary voltage, power distribution, direct lock control and network monitoring through add on modules. The power supply shall be expandable up to 16 individually protected outputs. Output modules shall provide individually protected, continuous outputs and/or individually protected, relay controlled outputs. Network modules shall provide remote monitoring functions such as status reporting, fault reporting and information logging.
 1. Manufacturers:
 - a. Securitron (SU) - AQL Series.
 - b. Altronix (AS) - Maximal 11F.

2.21 FABRICATION

- A. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to manufacturers recognized installation standards for application intended.

2.22 FINISHES

- A. Standard: Designations used in the Hardware Sets and elsewhere indicate hardware finishes complying with ANSI/BHMA A156.18, including coordination with traditional U.S. finishes indicated by certain manufacturers for their products.
- B. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness, and other qualities complying with manufacturer's standards, but in no case less than specified by referenced standards for the applicable units of hardware
- C. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine scheduled openings, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Notify architect of any discrepancies or conflicts between the door schedule, door types, drawings and scheduled hardware. Proceed only after such discrepancies or conflicts have been resolved in writing.

3.2 PREPARATION

- A. Hollow Metal Doors and Frames: Comply with ANSI/DHI A115 series.
- B. Wood Doors: Comply with ANSI/DHI A115-W series.

3.3 INSTALLATION

- A. Install each item of mechanical and electromechanical hardware and access control equipment to comply with manufacturer's written instructions and according to specifications.
 - 1. Installers are to be trained and certified by the manufacturer on the proper installation and adjustment of fire, life safety, and security products including: hanging devices; locking devices; closing devices; and seals.

- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."
 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
 3. Where indicated to comply with accessibility requirements, comply with ANSI A117.1 "Accessibility Guidelines for Buildings and Facilities."
 4. Provide blocking in drywall partitions where wall stops or other wall mounted hardware is located.
- C. Integrated Wiegand access control products are required to be installed through current members of the ASSA ABLOY "Certified Integrator" (CI) program. CI certification shall be submitted to the Architect for verification and approval of the installer of these items.
- D. Retrofitting: Install door hardware to comply with manufacturer's published templates and written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
- E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."
- F. Storage: Provide a secure lock up for hardware delivered to the project but not yet installed. Control the handling and installation of hardware items so that the completion of the work will not be delayed by hardware losses before and after installation.

3.4 FIELD QUALITY CONTROL

- A. Field Inspection (Punch Report): Reference Division 01 Sections "Closeout Procedures" and "Cash Allowances". Produce project punch report for each installed door opening indicating compliance with approved submittals and verification hardware is properly installed, operating and adjusted. Include list of items to be completed and corrected, indicating the reasons or deficiencies causing the Work to be incomplete or rejected.
1. Organization of List: Include separate Door Opening and Deficiencies and Corrective Action Lists organized by Mark, Opening Remarks and Comments, and related Opening Images and Video Recordings.
 2. Submit documentation of incomplete items in the following formats:
 - a. PDF electronic file.
 - b. Electronic formatted file integrated with the Openings Studio™ door opening management software platform.

3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

3.6 CLEANING AND PROTECTION

- A. Protect all hardware stored on construction site in a covered and dry place. Protect exposed hardware installed on doors during the construction phase. Install any and all hardware at the latest possible time frame.
- B. Clean adjacent surfaces soiled by door hardware installation.
- C. Clean operating items as necessary to restore proper finish. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of owner occupancy.

3.7 DEMONSTRATION

- A. Instruct Owner's maintenance personnel to adjust, operate, and maintain mechanical and electromechanical door hardware.

3.8 DOOR HARDWARE SETS

- A. The hardware sets represent the design intent and direction of the owner and architect. They are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application and functionality.

1. Quantities listed are for each pair of doors, or for each single door.
2. The supplier is responsible for handling and sizing all products.
3. Where multiple options for a piece of hardware are given in a single line item, the supplier shall provide the appropriate application for the opening.
4. Due to the various buildings and the numbering system used, this key will provide clarity for how they are outlined in the following sets:
 - a. 3-Digit Numbers without an alpha character prefix = CTAE Building
 - b. 4- Digit Numbers without an alpha character prefix = K-12 Building
 - c. 'F' Prefixed Door Numbers = Field House Building
 - d. FG1, FG2, FG3 = Field House Gates
 - e. 'PB' Prefixed Door Numbers = Press Box
 - f. 'C' Prefixed Door Numbers = Grand Stand Doors
 - g. 'RC' Prefixed Door Numbers = Ball Field Concession Areas

B.

Hardware Sets**Set: 001**

Doors: 1004, 1007, 1008, 1009, 1012.1, 1012.3, 1019.3, 1105, 1106, 1109, 1111, 1111.2, 1112, 1309.3, 1318.1, 1401, 1402, 1407, 1409.1, 1503.3, 1703.3, 1818.1, 1831.1, 1842, 1844, 1917, 1918, 1922.2, 2307.3, 2401.5, 2503.3, 2703.3, 2723.1, 2812.1, 2829, 2905, 2906, 3206, 3207, 3208, 3209, 3210, 3219.3, 3307.3, F1114, F1116, F1119, F1206, F1302.3, F2105, F2114, F2116, F2118, F2204

| | | | |
|-----------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 8205 LNJ GMK | US26D | SA |
| 1 Wall Stop | 409 | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Set: 002

Doors: F1120

| | | | |
|-----------------------|---------------------------|-------|----|
| 3 Hinge, Full Mortise | RC TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 8205 LNJ GMK | US26D | SA |
| 1 Wall Stop | 409 | US32D | RO |

Notes: Balance of weatherseals by the door supplier.

Set: 003

Doors: 1016, 1019, 1210, 1214, 1301, 1309, 1503, 1517, 1528, 1703, 1707, 1708, 1709, 1710, 1712, 1714, 1716, 1717, 1718, 1728, 1803, 1805, 1806, 1808, 1819, 1820, 1822, 1920, 2201, 2208, 2209, 2210, 2211, 2217.3, 2219.3, 2226, 2307, 2503, 2513, 2524, 2703, 2717, 2801, 2805.4, 2807.4, 2836, 3001, 3002, 3003, 3005, 3006, 3008, 3009, 3102, 3104, 3211, 3212, 3213, 3217, 3219, 3235, 3301, 3307, 3401, 3410.4, 3412.4, 3414, 3416.5

| | | | |
|-----------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 8205 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 004

Doors: 208

| | | | |
|-----------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 8205 LNJ GMK | US26D | SA |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S773BL 17' | US32D | PE |
| 1 Gasketing | S44BL 17' | US32D | PE |

Notes: Added seals for sound attenuation.

Set: 005

Doors: 1109.1, 1109.2, 1853, 2801.4, 3205, 3401.3

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 8205 LNJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 | 689 | RF |
| 3 Silencer | 608-RKW | | RO |

Set: 006

Doors: 1011, 1406, 1415, 1601, 2823

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 8205 LNJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 5459 | 689 | RF |
| 3 Silencer | 608-RKW | | RO |

Set: 007

| | | | |
|-------|-----------------------|-------|--|
| 1 N/A | HARDWARE SET NOT USED | US26D | |
|-------|-----------------------|-------|--|

Set: 008

Doors: 1005, 1110, 1114, 1409, 1412, 2403.1, 2810.2

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 8205 LNJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 5458 | 689 | RF |
| 3 Silencer | 608-RKW | | RO |

Set: 009

Doors: 1715, 3004, 3007, 3214, 3416.3

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| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 8205 LNJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 | 689 | RF |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 17' | 689 | PE |

Set: 010

Doors: 1602, 2601, 2603, 2605, 3303

| | | | |
|-----------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 8205 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 011

Doors: 1018.2, 1107, 1314, 1705.1, 1721.1, 1724.2, 1727.2, 1732.2, 1734.2, 1735.1, 1737.1, 1818.2, 1825.3, 1825.4, 1920.1, 1922.1, 2204.1, 226, 2308.1, 2310.1, 2311.1, 2312.1, 2313.1, 2314.1, 2315.1, 2317.1, 2401.6, 2403.2, 2403.3, 2410.1, 2414, 2504.1, 2505.1, 2506.1, 2507.1, 2508.1, 2509.1, 2510.1, 2511.1, 2516.1, 2518.1, 2519.1, 2520.1, 2521.1, 2522.1, 2523.1, 2525.1, 2723.3, 2810.1, 3218.1, 3308.1, 3310.1, 3311.1, 3312.1, 3313.1, 3314.1, 3315.1, 3317.1, F1304.5, F2106, F2111.2, F2207

| | | | |
|-------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Wall Stop | 409 | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Set: 012

Doors: 113.2, 1713, 1722.2, 1723.1, 213.2, 2217.4, 2219.4, 2805.3, 2807.3, 2837, 3304, 3318, 3407, 3410.3, 3412.3, 3416.4

| | | | |
|-------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 013

Doors: 1004.1, 1005.1, 1010, 1011.2, 104, 1110.2, 1111.1, 117, 1312.4, 1316.2, 1605, 1804.2, 1810.2, 1905.2, 204, 2102.1, 2104.3, 2722.1, 2723.2, 2812.2, 2825.3, 3204, 3212.1, 3214.1, 3225.1, F1110, F1113.3, F1302.2, F2103, F2115, F2212

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 | 689 | RF |
| 3 Silencer | 608-RKW | | RO |

Set: 014

Doors: 1418.1, 1421.1

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-136 | 689 | RF |
| 3 Silencer | 608-RKW | | RO |

Set: 015

Doors: 1843

| | | | |
|--------------------------------|--------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 5" x 4-1/2" | US26D | MK |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-536 | 689 | RF |
| 3 Silencer | 608-RKW | | RO |

Set: 016

Doors: 103, 203, 215

| | | | |
|-------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 17' | EN | PE |

Set: 017

Doors: 1003.3, 1907.2, 1908.2, F1117, F1205, F1208

| | | | |
|-------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |

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| | | | |
|--------------|----------------|-------|----|
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Set: 018

Doors: 1853.2

| | | | |
|-------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 40" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Set: 019

Doors: 1017, 1203, 1212, 1304, 1311, 1311.1, 1425, 1516, 1518, 1519, 1600, 1607.3, 1609, 1612, 1726, 1730, 1733, 1807, 1821, 1855, 1856, 1911, 1914, 1914.1, 2104.4, 2206, 2215, 2301, 2306.1, 2309, 2309.1, 2318, 2512, 2514, 2517, 2607, 2608, 2712, 2713, 2714.1, 2715.1, 2716, 2718, 2720, 2721, 2811, 2815, 2835, 2906.2, 2909, 3215, 3221, 3221.1, 3233, 3306.1, 3309, 3309.1, 3405.3, 3409.3, 3419, F1103, F1207.1, F2101

| | | | |
|-------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 020

Doors: 2213, 2809

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 | 689 | RF |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 021

Doors: 1103, 1849

RFP SET

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| | | | |
|-------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 P10 | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Set: 022

Doors: 1014, 1100.1, 1100.2, 1423

| | | | |
|-------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 P10 | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 023

Doors: 1108, 1306, 1502, 1906.1, 2305

| | | | |
|-------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 024

Doors: 1424

| | | | |
|-------------------------|--------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 5" x 4-1/2" | US26D | MK |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 46" | US32D | RO |
| 1 Gasketing | S88D 18' | US32D | PE |

Set: 025

Doors: 2600.3, 2710.1, 2711.1, 3223.3, 3227.3

| | | | |
|-------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |

| | | | |
|------------------|----------------|-------|----|
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 026

Doors: 1205.3

| | | | |
|-------------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 Flush Bolt | 555 | US26D | RO |
| 1 Dust Proof Strike | 570 | US26D | RO |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 2 Wall Stop | 409 | US32D | RO |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |
| 2 Silencer | 608-RKW | | RO |

Set: 027

Doors: 1719

| | | | |
|-------------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 Flush Bolt | 555 | US26D | RO |
| 1 Dust Proof Strike | 570 | US26D | RO |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 P10 | EN | SA |
| 2 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 18' | US32D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |

Notes: Mount closer to active leaf only.

Set: 028

Doors: 1608, 1910

| | | | |
|--------------------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 Flush Bolt | 555 | US26D | RO |
| 1 Dust Proof Strike | 570 | US26D | RO |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 2 Surface Overhead Holder/Stop | 9-336 | 689 | RF |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Gasketing | S88D 20' | 689 | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | 689 | PE |

Notes: Mount closer to active leaf only.

Set: 029

Doors: 1403.5, 1403.6, 1403.7, 1408, 1837, 1839

| | | | |
|-------------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 Flush Bolt | 555 | US26D | RO |
| 1 Dust Proof Strike | 570 | US26D | RO |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 2 Astragal | 29324CNB x 84" Black Brush | EN | PE |
| 2 Silencer | 608-RKW | | RO |

Notes: Mount closer to active leaf only.

Set: 030

Doors: 1834, 1922

| | | | |
|-------------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 Flush Bolt | 555 | US26D | RO |
| 1 Dust Proof Strike | 570 | US26D | RO |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 20' | EN | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | EN | PE |

Notes: Mount closer to active leaf only.

Set: 031

Doors: 1606

| | | | |
|--------------------------------|------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 Flush Bolt | 555 | US26D | RO |
| 1 Dust Proof Strike | 570 | US26D | RO |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 5458 | 689 | RF |
| 1 Surface Overhead Holder/Stop | 9-336 5459 | 689 | RF |

| | | | |
|------------|----------------------------|-----|----|
| 2 Astragal | 29324CNB x 84" Black Brush | 689 | PE |
| 2 Silencer | 608-RKW | | RO |

Set: 032

| | | | |
|-------|-----------------------|-------|--|
| 1 N/A | HARDWARE SET NOT USED | US26D | |
|-------|-----------------------|-------|--|

Set: 033

Doors: 119, 2203.3, F2112.2

| | | | |
|--------------------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 Flush Bolt | 555 | US26D | RO |
| 1 Dust Proof Strike | 570 | US26D | RO |
| 1 Storeroom/Closet Lock | 21 8204 LNJ GMK | US26D | SA |
| 2 Surface Overhead Holder/Stop | 9-336 | 689 | RF |
| 2 Astragal | 29324CNB x 84" Black Brush | 689 | PE |
| 2 Silencer | 608-RKW | | RO |

Set: 034

Doors: 2833.3, C01, C02, C04, C06, DG112, DG112A, DG112B

| | | | |
|-----------------------|-----------------------------|-------|----|
| 3 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Dormitory/Exit Lock | 10 21 8225 LNJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 36" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 36" x 84" TKSP | US32D | PE |
| 1 Sweep | 315CN x 36" TKSP | US32D | PE |

Set: 035

Doors: 1320

| | | | |
|-----------------------|-----------------------------|-------|----|
| 6 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 2 Flush Bolt | 556WS | US26D | RO |
| 1 Dormitory/Exit Lock | 10 21 8225 LNJ GMK | US32D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 72" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 72" x 84" TKSP | US32D | PE |
| 2 Sweep | 315CN x 36" TKSP | US32D | PE |

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| | | | |
|---------------|----------------------------|-------|----|
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |
| 2 Switch | 3287 | US32D | SA |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | US32D | |

Notes: Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Both doors are monitored for DPS only.

Set: 036

Doors: 1922.3

| | | | |
|-----------------------|-----------------------------|-------|----|
| 6 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 2 Flush Bolt | 556WS | US26D | RO |
| 1 Dormitory/Exit Lock | 10 21 8225 LNJ GMK | US32D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 37" | US32D | RO |
| 1 Threshold | 272A x 78" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 78" x 84" TKSP | US32D | PE |
| 2 Sweep | 315CN x 39" TKSP | US32D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |
| 2 Switch | 3287 | US32D | SA |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | US26D | |

Notes: Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Both doors are monitored for DPS only.

Set: 037

Doors: 1926, F1209, F1213, F1301.1

| | | | |
|-----------------------|-----------------------------|-------|----|
| 3 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Dormitory/Exit Lock | 10 21 8225 LNJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 36" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 36" x 84" TKSP | US32D | PE |
| 1 Sweep | 315CN x 36" TKSP | US32D | PE |
| 1 Switch | 3287 | US32D | SA |
| 1 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Door is monitored for DPS only.

Set: 038

Doors: 118, 1531, F103, F104, F105, F108, F109, F110, F1211, F1212, F1302.1, PB109, PB109A, PB111, PB111A, RC101, RC102, RC103, RC107

| | | | |
|-----------------------|-----------------------------|-------|----|
| 3 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Dormitory/Exit Lock | 10 21 8225 LNJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 36" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 36" x 84" TKSP | US32D | PE |
| 1 Sweep | 315CN x 36" TKSP | US32D | PE |
| 1 Switch | 3287 | US32D | SA |
| 1 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Door is monitored for DPS only.

Set: 039

Doors: 1018, 1204, 1206, 1208, 125.1, 1308, 1310, 1312, 1313, 1315, 1316, 1317, 1318, 1319, 1507, 1508, 1509, 1510, 1511, 1512, 1513, 1514, 1520, 1521, 1522, 1523, 1524, 1525, 1527, 1721, 1722, 1725, 1804, 1810, 1816, 1818, 1825.1, 1825.2, 1831, 1831.2, 1905, 2102, 2104.1, 2104.2, 2204, 2205.1, 2214, 2216, 2217.1, 2217.2, 2218, 2219.1, 2219.2, 2220, 2222, 2224, 2225, 2304, 2308, 2310, 2311, 2312, 2313, 2314, 2315, 2316, 2317, 2504, 2505, 2506, 2507, 2508, 2509, 2510, 2511, 2516, 2518, 2519, 2520, 2521, 2523, 2704, 2705, 2706, 2707, 2708, 2709, 2722, 2723, 2805.1, 2805.2, 2806, 2807.1, 2807.2, 2808, 2810, 2810.4, 2812, 2812.4, 2814, 2816, 2818, 2902.1, 2902.2, 3101, 3103, 3222, 3224, 3226, 3228, 3230, 3232, 3234, 3308, 3310, 3311, 3312, 3313, 3315, 3316, 3317, 3404, 3406, 3408, 3410.1, 3410.2, 3412.1, 3412.2, 3416.1, 3416.2, 3417, 3418, 3421, 3422, 3423

| | | | |
|-----------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 V01 8205 LNJ GMK | US26D | SA |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 040

Doors: 1729.1, 1732.3, 1737.3, 2401.1, 2401.3, 2826, 2826.1, 2910, F2111.1, F2112.1

| | | | |
|-----------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 V01 8205 LNJ GMK | US26D | SA |
| 1 Wall Stop | 409 | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Set: 041

Doors: 2810.3, 2812.3, F1201.3, F1202.3, PB110, PB110A

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 V01 8205 LNJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 | 689 | RF |
| 3 Silencer | 608-RKW | | RO |

Set: 042

Doors: F2201

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 V01 8205 LNJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 5459 | 689 | RF |
| 3 Silencer | 608-RKW | | RO |

Set: 043

Doors: 1723

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 V01 8205 LNJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 5458 | 689 | RF |
| 3 Silencer | 608-RKW | | RO |

Set: 044

Doors: 1526, 1705, 1727, 1732, 1737, 1812, 2522, 3314

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 V01 8205 LNJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 5459 | 689 | RF |
| 1 Gasketing | S88D 17' | 689 | PE |

Set: 045

Doors: 1724, 1729, 1734, 1735, 2525

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 V01 8205 LNJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 5458 | 689 | RF |
| 1 Gasketing | S88D 17' | 689 | PE |

Set: 046

Doors: 212

| | | | |
|-----------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 V01 8205 LNJ GMK | US26D | SA |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Threshold | 2008APK x 36" | US32D | PE |
| 1 Gasketing | S773BL 17' | US32D | PE |
| 1 Gasketing | S44BL 17' | US32D | PE |

Set: 047

Doors: 2710, 2711, 2715

| | | | |
|-----------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 V01 8205 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 048

Doors: 1610.1, 1611.1, 2714

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 V01 8205 LNJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 | 689 | RF |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Gasketing | S88D 17' | 689 | PE |

Set: 049

Doors: 1610.2, 1611.2, 3223.1, 3223.2, 3227.1, 3227.2, 3405.1, 3405.2, 3409.1, 3409.2

| | | | |
|-----------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Office/Entry Lock | 21 V01 8205 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 P10 | EN | SA |

| | | | |
|--------------|----------------|-------|----|
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 050

Doors: 3201.1, 3202

| | | | |
|------------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Classroom Security Intruder Lock | 21 8238 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 051

Doors: 1706, 1720

| | | | |
|------------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Classroom Security Intruder Lock | 21 8238 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 P10 | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 052

Doors: 1831.3

| | | | |
|------------------------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 Flush Bolt | 555 | US26D | RO |
| 1 Dust Proof Strike | 570 | US26D | RO |
| 1 Classroom Security Intruder Lock | 21 8238 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 20' | US32D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |

Notes: Mount closer to the active leaf.

Set: 053

Doors: 1202.1, 1202.2

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| | | | |
|-----------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 Flush Bolt | 555 | US26D | RO |
| 1 Dust Proof Strike | 570 | US26D | RO |
| 1 Office/Entry Lock | 21 V01 8205 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 2 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 20' | US32D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |

Notes: Mount closer to the active leaf.

Set: 054

Doors: F1104, F1105, F1107

| | | | |
|-----------------------------|----------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Asylum/Institutional Lock | 21 8217 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Notes: These doors are locked from both sides at all times. Key operation required. Confirm application with the Authority Having Jurisdiction.

Set: 055

Doors: 1002.1, 1011.1, 1019.1, 1019.2, 109.2, 1104, 1110.1, 1309.1, 1309.2, 1318.2, 1407.1, 1410.1, 1413.1, 1416.1, 1419.1, 1503.1, 1503.2, 1528.1, 1528.2, 1610.3, 1611.3, 1703.1, 1703.2, 1705.2, 1721.2, 1722.1, 1723.2, 1724.1, 1725.2, 1725.3, 1732.1, 1734.1, 1735.2, 1737.2, 1804.1, 1810.1, 1846.1, 1846.2, 1905.1, 1920.2, 2307.1, 2307.2, 2401.2, 2401.4, 2411.2, 2411.3, 2503.1, 2503.2, 2703.1, 2703.2, 2801.2, 2801.3, 2828, 2906.1, 3203, 3219.1, 3219.2, 3307.1, 3307.2, 3401.1, 3401.2, F1203.1, F1203.2, F1203.3, F1203.4, F1203.5, F1204.1, F1204.2, F1204.3, F1204.4, F1204.5, F1206.1, F2211, F2214

| | | | |
|-----------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Privacy Lock | V20 8265 LNJ | US26D | SA |
| 1 Wall Stop | 409 | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Set: 056

Doors: 110, 111, 1114.1, 1114.2, 1418, 1421, 1913, 1915, C03, C05, F1102, F1106, F1108, F1303, F2108, F2110

| | | | |
|-----------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Privacy Lock | V20 8265 LNJ | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Set: 057

Doors: 1711, 1813, 1815, 1916, 2524.1, 2524.2

| | | | |
|-----------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Privacy Lock | V20 8265 LNJ | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 058

Doors: 1410.3, 1410.4, 1410.5, 1413.3, 1416.3, 1416.4, 1416.5, 1419.3

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Privacy Lock | V20 8265 LNJ | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-136 | 689 | RF |
| 3 Silencer | 608-RKW | | RO |

Set: 059

Doors: 1410.2, 1413.2, 1416.2, 1419.2, F1203, F1204, F1206.2

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Privacy Lock | V20 8265 LNJ | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 | 689 | RF |
| 3 Silencer | 608-RKW | | RO |

Set: 060

Doors: 1018.1

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Privacy Lock | V20 8265 LNJ | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 5459 | 689 | RF |

| | | | |
|------------|---------|--|----|
| 3 Silencer | 608-RKW | | RO |
|------------|---------|--|----|

Set: 061

Doors: 1322, 1530

| | | | |
|----------------------|-----------------------------|-------|----|
| 3 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Privacy Lock | V20 8265 LNJ | US26D | SA |
| 1 Classroom Deadlock | 10 21 4877 GMK | US26D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 36" MSES10 | EN | PE |
| 1 Gasketing | 303AS x 36" x 84" TKSP | EN | PE |
| 1 Sweep | 315CN x 36" TKSP | EN | PE |
| 1 Switch | 3287 | US32D | SA |
| 1 Frame Cable | MCC-FR 75' 2 COND DPS | US32D | |

Notes: Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Door is monitored for DPS only.

Set: 062

Doors: 1308.2, 1308.3, 1313.2, 1313.3, 1317.2, 1317.3, 1507.2, 1507.3, 1508.2, 1508.3, 1510.1, 1511.2, 1511.3, 1512.2, 1512.3, 1520.2, 1520.3, 1521.2, 1521.3, 1524.2, 1524.3, 1525.2, 1525.3, 1725.1, 1727.1, 2403.4, 2403.5, 2403.6, 2403.7, 2411.1, 2411.4

| | | | |
|-----------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Passage Latch | 8215 LNJ | US26D | SA |
| 1 Wall Stop | 409 | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Set: 063

Doors: 1308.1, 1310.1, 1312.1, 1312.2, 1312.3, 1313.1, 1315.1, 1316.1, 1317.1, 1319.1, 1507.1, 1508.1, 1509.1, 1511.1, 1512.1, 1513.1, 1514.1, 1520.1, 1521.1, 1522.1, 1523.1, 1524.1, 1525.1, 1526.1, 1527.1, 2413

| | | | |
|--------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Passage Latch | 8215 LNJ | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 | 689 | RF |
| 3 Silencer | 608-RKW | | RO |

Set: 064

Doors: F1111, F1112, F2206

| | | | |
|-----------------------|----------------------------|-------|----|
| 3 Hinge, Full Mortise | RC TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 Door Pull | RM3300-24 Mtg-Type 5HD 18" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |

Notes: Balance of weatherseals by the door supplier.

Set: 065

Doors: F2109, F2203

| | | | |
|--------------------------------|----------------------------|-------|----|
| 3 Hinge, Full Mortise | RC TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 Door Pull | RM3300-24 Mtg-Type 5HD 18" | US32D | RO |
| 1 Surface Overhead Holder/Stop | 9-336 | 689 | RF |

Notes: Balance of weatherseals by the door supplier.

Set: 066

Doors: 1604.2, 1604.4

| | | | |
|-----------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 4 Door Pull | RM3300-24 Mtg-Type 5HD 18" | US32D | RO |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S44BL 20' | US32D | PE |
| 1 Gasketing | S773BL 20' | US32D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |

Set: 067

Doors: 2606.1, 2606.2

| | | | |
|-----------------------|----------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 Door Pull | RM3300-24 Mtg-Type 5HD 18" | US32D | RO |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S773BL 17' | US32D | PE |
| 1 Gasketing | S44BL 17' | US32D | PE |

Set: 068

Doors: F1113.2

| | | | |
|-----------------------|----------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 Door Pull | RM3300-24 Mtg-Type 5HD 18" | US32D | RO |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Set: 069

Doors: F2210, F2213

| | | | |
|-----------------------|------------------------|--------------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Arm Pull | AP1007 | US32D- MS | RO |
| 1 Push Plate | 73C | US32D- MS | RO |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Set: 070

Doors: 1809, 1811

| | | | |
|------------------------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Classroom Security Intruder Lock | 21 8238 LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 071

Doors: 1807.1, 1809.1, 2827

| | | | |
|-----------------------|------------------------|--------------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Arm Pull | AP1007 | US32D- MS | RO |
| 1 Push Plate | 73C | US32D- MS | RO |

| | | | |
|------------------|----------------|-------|----|
| 1 Surface Closer | TB 351 P10 | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Set: 072

Doors: 1410, 1411, 1413, 1414, 1416, 1417, 1419, 1420, 1846

| | | | |
|-----------------------|------------------------|--------------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Classroom Deadlock | 21 4877 GMK | US26D | SA |
| 1 Arm Pull | AP1007 | US32D- MS | RO |
| 1 Push Plate | 73C | US32D- MS | RO |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Set: 073

Doors: 1404, 1405, 1907, 1908

| | | | |
|-----------------------|------------------------|--------------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Classroom Deadlock | 21 4877 GMK | US26D | SA |
| 1 Arm Pull | AP1007 | US32D- MS | RO |
| 1 Push Plate | 73C | US32D- MS | RO |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 074

Doors: 1850, 1850.1, 1850.2

| | | | |
|-----------------------|------------------------|--------------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Classroom Deadlock | 21 4877 GMK | US26D | SA |
| 1 Arm Pull | AP1007 | US32D- MS | RO |
| 1 Push Plate | 73C | US32D- MS | RO |
| 1 Surface Closer | TB 351 CPSH | EN | SA |

| | | | |
|--------------|----------------|-------|----|
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Set: 075

Doors: 1840.4

| | | | |
|-----------------------|------------------------|----------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Classroom Deadlock | 21 4877 GMK | US26D | SA |
| 1 Arm Pull | AP1007 | US32D-MS | RO |
| 1 Push Plate | 73C | US32D-MS | RO |
| 1 Surface Closer | TB 351 CPSH | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 076

Doors: 1840.3

| | | | |
|-----------------------|------------------------|----------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Classroom Deadlock | 21 4877 GMK | US26D | SA |
| 1 Arm Pull | AP1007 | US32D-MS | RO |
| 1 Push Plate | 73C | US32D-MS | RO |
| 1 Surface Closer | 351 PH10 | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Notes: Door to open 180 deg.

Set: 077

Doors: F101, F102, F106, F107, RC106, RC108

| | | | |
|----------------------|-----------------------------|----------|----|
| 3 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Classroom Deadlock | 10 21 4877 GMK | US26D | SA |
| 1 Arm Pull | AP1007 | US32D-MS | RO |
| 1 Push Plate | 73C | US32D-MS | RO |
| 1 Surface Closer | TB 351 CPS | EN | SA |

| | | | |
|---------------|------------------------|-------|----|
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 36" MSES10 | US26D | PE |
| 1 Gasketing | 303AS x 36" x 84" TKSP | US32D | PE |
| 1 Sweep | 315CN x 36" TKSP | US26D | PE |
| 1 Switch | 3287 | US26D | SA |
| 1 Frame Cable | MCC-FR 75' 2 COND DPS | US26D | |

Notes: Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Doors are monitored for DPS only.

Set: 078

Doors: F2205.3, F2205.5

| | | | |
|--------------------|----------------------------|-------|----|
| 6 Hinge, Hvy Wt | RC T4A3386 4-1/2" x 4-1/2" | US32D | MK |
| 2 Multi-Point Lock | NB AD700115 ETJ | US26D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Drop Plate | 351D | EN | SA |
| 2 Kit | 581-2 | EN | SA |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application.

Set: 079

Doors: F2205.4

| | | | |
|--------------------|----------------------------|-------|----|
| 6 Hinge, Hvy Wt | RC T4A3386 4-1/2" x 4-1/2" | US32D | MK |
| 1 Multi-Point Lock | 10 NB 21 AD701315 ETJ GMK | US26D | SA |
| 1 Multi-Point Lock | NB AD700115 ETJ | US26D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Drop Plate | 351D | EN | SA |
| 2 Kit | 581-2 | EN | SA |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application.

Set: 080

Doors: 108, 109.1, 112, 206, 207, 211, 224.1

| | | | |
|-----------------------|---------------------------|-------|----|
| 3 Hinge, Full Mortise | RC TA2714 4-1/2" x 4-1/2" | US26D | MK |
|-----------------------|---------------------------|-------|----|

C24-01 ATHLETIC FIELDS & FIELDHOUSE

RFP SET

May 12, 2023

| | | | |
|--------------------|------------------------|-------|----|
| 1 Multi-Point Lock | NB 21 AD701315 ETJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Drop Plate | 351D | EN | SA |
| 1 Kit | 581-2 | EN | SA |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application.

Set: 081

Doors: 116, 2825.1, 2825.2

| | | | |
|--------------------------------|---------------------------|-------|----|
| 3 Hinge, Full Mortise | RC TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Multi-Point Lock | NB 21 AD701315 ETJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 | 689 | RF |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application.

Set: 082

Doors: 2907.2

| | | | |
|--------------------------------|---------------------------|-------|----|
| 3 Hinge, Full Mortise | RC TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Multi-Point Lock | NB 21 AD701315 ETJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 5459 | 689 | RF |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application.

Set: 083

Doors: 125.2, 2907.1, F2215

| | | | |
|--------------------------------|---------------------------|-------|----|
| 6 Hinge, Full Mortise | RC TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Multi-Point Lock | NB 21 AD701315 ETJ GMK | US26D | SA |
| 1 Multi-Point Lock | NB AD700115 ETJ | US26D | SA |
| 2 Surface Overhead Holder/Stop | 9-336 | 689 | RF |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application.

Set: 084

Doors: F2104

| | | | |
|-----------------------|---------------------------|-------|----|
| 3 Hinge, Full Mortise | RC TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Multi-Point Lock | NB 21 AD701315 ETJ GMK | US26D | SA |
| 1 Wall Stop | 409 | US32D | RO |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application.

Set: 085

Doors: 209, 210, 224.2, 225

| | | | |
|-----------------------|---------------------------|-------|----|
| 3 Hinge, Full Mortise | RC TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Multi-Point Lock | NB 21 AD701315 ETJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Drop Plate | 351D | EN | SA |
| 1 Kit | 581-2 | EN | SA |
| 1 Wall Stop | 409 | US32D | RO |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application.

Set: 086

Doors: 101.3

| | | | |
|--------------------------------|----------------------------|-------|----|
| 3 Hinge, Hvy Wt | RC T4A3386 4-1/2" x 4-1/2" | US32D | MK |
| 1 Multi-Point Lock | 10 NB 21 AD700615 ETJ GMK | US26D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 | 630 | RF |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Switch | 3287 | US26D | SA |
| 1 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Door is monitored for DPS only.

Set: 087

Doors: 115.1, 217.1, 217.2, 218.1, 218.2, 219.1, 219.2

| | | | |
|-----------------------|---------------------------|-------|----|
| 3 Hinge, Full Mortise | RC TA2714 4-1/2" x 4-1/2" | US26D | MK |
|-----------------------|---------------------------|-------|----|

C24-01 ATHLETIC FIELDS & FIELDHOUSE

RFP SET

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| | | | |
|-------------------|-------------------|-------|----|
| 1 Rim Exit Device | 21 AD8513 ETJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Drop Plate | 351D | EN | SA |
| 1 Kit | 581-2 | EN | SA |

Notes: Balance of weatherseals by the door supplier.

Set: 088

Doors: 2821.1, 2821.2

| | | | |
|---------------------------|---------------------------|-------|----|
| 6 Hinge, Full Mortise | RC TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Concealed Vert Rod Exit | 21 AD8413 ETJ GMK | US32D | SA |
| 1 Concealed Vert Rod Exit | AD8410 EO | US32D | SA |
| 2 Surface Closer | TB 351 P10 | EN | SA |
| 1 Drop Plate | 351D | EN | SA |
| 1 Kit | 581-2 | EN | SA |
| 2 Wall Stop | 409 | US32D | RO |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application.

Set: 089

Doors: 107, F2205.1

| | | | |
|---------------------------|-------------------------------|-------|----|
| 6 Hinge, Full Mortise | RC TA2314xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Concealed Vert Rod Exit | 21 AD8413 ETJ GMK | US32D | SA |
| 1 Concealed Vert Rod Exit | AD8410 EO | US32D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Drop Plate | 351D | EN | SA |
| 2 Kit | 581-2 | EN | SA |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application.

Set: 090

Doors: F1100.S2

| | | | |
|-------------------|----------------------------|-------|----|
| 3 Hinge, Hvy Wt | RC T4A3386 4-1/2" x 4-1/2" | US32D | MK |
| 1 Rim Exit Device | WS AD8510 EO | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |

| | | | |
|---------------|-----------------------|----|----|
| 1 Drop Plate | 351D | EN | SA |
| 1 Kit | 581-2 | EN | SA |
| 1 Switch | 3287 | EN | SA |
| 1 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Balance of weatherseals by the door supplier. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Door is Exit Only, with mechanical dogging allowed, and monitored for DPS only.

Set: 091

Doors: 115.2, 124.2, F1113.1

| | | | |
|-------------------|----------------------------|-------|----|
| 3 Hinge, Hvy Wt | RC T4A3386 4-1/2" x 4-1/2" | US32D | MK |
| 1 Rim Exit Device | 10 21 WS AD8513 ETJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Drop Plate | 351D | EN | SA |
| 1 Kit | 581-2 | EN | SA |
| 1 Switch | 3287 | US32D | SA |
| 1 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Balance of weatherseals by the door supplier. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Door is monitored for DPS only.

Set: 092

Doors: 1100.3, 1100.4, 1400.1, 1400.2, 1400.3, 1400.4, 1814.1

| | | | |
|---------------------------|----------------------------|-------|----|
| 6 Hinge, Hvy Wt | RC T4A3386 4-1/2" x 4-1/2" | US32D | MK |
| 2 Concealed Vert Rod Exit | AD8410 862 | US32D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Drop Plate | 351D | EN | SA |
| 2 Kit | 581-2 | EN | SA |
| 2 Switch | 3287 | US26D | SA |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located

above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Both doors are Exit Only, with mechanical dogging allowed, monitored for DPS only.

Set: 093

Doors: F1200

| | | | |
|---------------------------|-------------------------------|-------|----|
| 6 Hinge, Hvy Wt | RC T4A3386 4-1/2" x 4-1/2" | US32D | MK |
| 1 Concealed Vert Rod Exit | AD8410 862 | US32D | SA |
| 1 Concealed Vert Rod Exit | 10 16 21 AD8410 113 x 862 GMK | US32D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Drop Plate | 351D | EN | SA |
| 2 Kit | 581-2 | EN | SA |
| 2 Switch | 3287 | 689 | SA |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Both doors are monitored for DPS only.

Set: 094

Doors: 100, 101.1, 1020.2, 1321.2, 1515.2, 1529.2, 1731.2, 1800.2, 1824.2, 1900.7

| | | | |
|---------------------------|----------------------------|-------|----|
| 6 Hinge, Hvy Wt | RC T4A3386 4-1/2" x 4-1/2" | US32D | MK |
| 2 Concealed Vert Rod Exit | LD AD8410 EO | US32D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Drop Plate | 351D | EN | SA |
| 2 Kit | 581-2 | EN | SA |
| 2 Switch | 3287 | EN | SA |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Both doors are Exit Only and monitored for DPS only.

Set: 095

Doors: 1000.2, 1101.2, 1900.4

| | | | |
|---------------------------|---------------------------------|-------|----|
| 2 Electric Hinge, Hvy Wt | RC T4A3386-QC12 4-1/2" x 4-1/2" | US32D | MK |
| 4 Hinge, Hvy Wt | RC T4A3386 4-1/2" x 4-1/2" | US32D | MK |
| 2 Concealed Vert Rod Exit | LD 55 AD8410 EO | US32D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Drop Plate | 351D | EN | SA |
| 2 Kit | 581-2 | EN | SA |
| 2 Switch | 3287 | EN | SA |
| 2 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | | |
| 2 Door Cable | MCC-DR 6" | | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Both doors are Exit Only and monitored for REX and DPS.

Set: 096

Doors: 1000.1, 101.2, 1101.1, 1115.2, 1300.2, 1500.2, 1700.2, 1814.2, 1830.3, 1900.3, 1921.2, F1101.1

| | | | |
|---------------------------|----------------------------------|-------|----|
| 2 Electric Hinge, Hvy Wt | RC T4A3386-QC12 4-1/2" x 4-1/2" | US32D | MK |
| 4 Hinge, Hvy Wt | RC T4A3386 4-1/2" x 4-1/2" | US32D | MK |
| 1 Concealed Vert Rod Exit | 10 21 55 56 AD8410 106 x 862 GMK | US32D | SA |
| 1 Concealed Vert Rod Exit | LD 55 56 AD8410 862 | US32D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Drop Plate | 351D | EN | SA |
| 2 Kit | 581-2 | EN | SA |
| 2 Switch | 3287 | EN | SA |
| 2 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | | |
| 1 Door Cable | MCC-DR 48" | | |
| 2 Door Cable | MCC-DR 6" | | |
| 1 Electronic Controls | 6005BKB00 | BLACK | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application. Card reader shall be door mounted. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the SER-12 current transfer. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled

under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. Both doors have electrified latch retraction and are monitored for REX and DPS.

Set: 097

Doors: 1001.1, 1101.4, 1830.2, 1921.1

| | | | |
|---------------------------|--------------------------------|-------|----|
| 4 Hinge, Full Mortise | RC TA2314xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 2 Electric Hinge | RC TA2314-QC12 4-1/2" x 4-1/2" | US32D | MK |
| 1 Concealed Vert Rod Exit | 21 55 56 AD8410 106 x 862 GMK | US32D | SA |
| 1 Concealed Vert Rod Exit | LD 55 AD8410 EO | US32D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Drop Plate | 351D | EN | SA |
| 2 Kit | 581-2 | EN | SA |
| 2 Switch | 3287 | EN | SA |
| 2 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | | |
| 2 Door Cable | MCC-DR 48" | | |
| 2 Door Cable | MCC-DR 6" | | |
| 1 Electronic Controls | 6005BKB00 | BLACK | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application. Card reader shall be door mounted. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the SER-12 current transfer. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. Both doors are monitored for REX and DPS. Active leaf has electrified latch retraction.

Set: 098

Doors: 1001.2, 1101.3

| | | | |
|---------------------------|--------------------------------|-------|----|
| 4 Hinge, Full Mortise | RC TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 2 Electric Hinge | RC TA2714-QC12 4-1/2" x 4-1/2" | US26D | MK |
| 2 Concealed Vert Rod Exit | LD 55 AD8410 EO | US32D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Drop Plate | 351D | EN | SA |
| 2 Kit | 581-2 | EN | SA |
| 2 Switch | 3287 | EN | SA |
| 2 Frame Cable | MCC-FR 75' 12 COND 20GA | | |

| | | | | |
|---|--------------|-----------------------|--|----|
| 2 | Frame Cable | MCC-FR 75' 2 COND DPS | | |
| 2 | Door Cable | MCC-DR 6" | | |
| 1 | Power Supply | AQL6-R8E1 | | SU |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Both doors are Exit Only and monitored for REX and DPS.

Set: 099

Doors: 1003.2, 1103.1

| | | | | |
|---|--------------------------|--------------------------------|-------|----|
| 2 | Hinge, Full Mortise | RC TA2314xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 | Electric Hinge | RC TA2314-QC12 4-1/2" x 4-1/2" | US32D | MK |
| 1 | Access Control Mort Lock | 21 H1-82271 24V LNJ GMK | US26D | SA |
| 1 | Surface Closer | TB 351 O | EN | SA |
| 1 | Kit | 581-2 | EN | SA |
| 1 | Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 | Wall Stop | 409 | US32D | RO |
| 1 | Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 1 | Door Cable | MCC-DR 48" | | |
| 1 | Power Supply | AQL6-R8E1 | | SU |

Notes: Balance of weatherseals by the door supplier. Integrated Wiegand card reader lockset. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the QC12 hinge. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. Card Reader located on the Lobby side. Door is monitored for REX and DPS.

Set: 100

Doors: 1002, 1102.1

| | | | | |
|---|---------------------|--------------------------------|-------|----|
| 2 | Hinge, Full Mortise | RC TA2314xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 | Electric Hinge | RC TA2314-QC12 4-1/2" x 4-1/2" | US32D | MK |
| 1 | Multi-Point Lock | NB 21 H1-AD707406 24V ETJ GMK | US26D | SA |
| 1 | Surface Closer | TB 351 O | EN | SA |
| 1 | Drop Plate | 351D | EN | SA |
| 1 | Kit | 581-2 | EN | SA |

| | | | |
|----------------------|-------------------------|-------|----|
| 1 Wall Stop | 409 | US32D | RO |
| 1 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 1 Door Cable | MCC-DR 48" | | |
| 1 Push Button Switch | 660-PB | EN | SH |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application. Integrated Wiegand card reader multi-point lockset. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the QC12 hinge. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. 660-PB push button to be mounted under a desk. Coordinate the location with the Architect. Locate the terminal end of the cable for the push button at the gateway controlling the card readers. Card Reader located on Entry Vestibule side. Door is monitored for REX and DPS.

Set: 101

Doors: 1400.5, 1400.6

| | | | |
|-----------------------|-------------------------------|-------|----|
| 6 Hinge, Full Mortise | RC TA2314xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 2 Multi-Point Lock | NB 21 AD700606 ETJ GMK | US26D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Drop Plate | 351D | EN | SA |
| 2 Kit | 581-2 | EN | SA |
| 2 Switch | 3287 | EN | SA |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application. Both doors are to remain locked at all times, keyed both sides. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Doors are monitored for DPS only.

Set: 102

Doors: 1002.2, 1102.2

| | | | |
|----------------------------|--------------------------------|-------|----|
| 2 Hinge, Full Mortise | RC TA2314xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Electric Hinge | RC TA2314-QC12 4-1/2" x 4-1/2" | US32D | MK |
| 1 Access Control Mort Lock | 21 H1-82271 24V LNJ GMK | US26D | SA |
| 1 Mortise Deadlock | 21 4874 GMK | US26D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |

| | | | |
|------------------------|-------------------------|-------|----|
| 1 Kit | 581-2 | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 1 Door Cable | MCC-DR 48" | | |
| 1 4 DOOR RELEASE PANEL | CP-24ANG | 32D | AK |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Balance of weatherseals by the door supplier. Integrated Wiegand card reader lockset. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the QC12 hinge. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. 660-PB push button to be mounted under a desk. Coordinate the location with the Architect. Locate the terminal end of the cable for the push button at the gateway controlling the card readers. Card Reader on the Lobby side. Doors are monitored for REX and DPS. Deadbolt is engaged for after hours only to secure the office area from access by the corridor.

Deadbolt to be secured after hours only to secure the visitor lobbies.

Set: 103

Doors: 1003.1, 1103.2

| | | | |
|----------------------------|--------------------------------|-------|----|
| 2 Hinge, Full Mortise | RC TA2314xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Electric Hinge | RC TA2314-QC12 4-1/2" x 4-1/2" | US32D | MK |
| 1 Access Control Mort Lock | 21 H1-82271 24V LNJ GMK | US26D | SA |
| 1 Mortise Deadlock | 21 4874 GMK | US26D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kit | 581-2 | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 1 Door Cable | MCC-DR 48" | | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Balance of weatherseals by the door supplier. Integrated Wiegand card reader lockset. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the QC12 hinge. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. Card Reader located on the Reception side. Doors are monitored for REX and DPS. Deadbolt is engaged for after hours only to secure the office area from access by the corridor.

Deadbolt to be secured after hours only to secure the visitor lobbies.

Set: 104

Doors: 1836.3, 1836.4

| | | | |
|---------------------------|-------------------------------|-------|----|
| 6 Hinge, Full Mortise | RC TA2314xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Concealed Vert Rod Exit | 21 AD8410 113 x 862 GMK | US32D | SA |
| 1 Concealed Vert Rod Exit | AD8410 EO | US32D | SA |
| 2 Surface Closer | TB 351 P10 | EN | SA |
| 2 Drop Plate | 351D | EN | SA |
| 2 Kit | 581-2 | EN | SA |
| 2 Wall Stop | 409 | US32D | RO |

Notes: Balance of weatherseals by the door supplier. Doors open 180 deg. Doors to have wide stiles to accommodate hardware application.

Set: 105

Doors: 2901.1, 2901.2

| | | | |
|---------------------------|-------------------------------|-------|----|
| 6 Hinge, Full Mortise | RC TA2314xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Concealed Vert Rod Exit | 21 AD8410 113 x 862 GMK | US32D | SA |
| 1 Concealed Vert Rod Exit | AD8410 EO | US32D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Drop Plate | 351D | EN | SA |
| 2 Kit | 581-2 | EN | SA |

Notes: Balance of weatherseals by the door supplier. Doors to have wide stiles to accommodate hardware application.

Set: 106

Doors: 2833.1

| | | | |
|----------------------------|-----------------------------|-------|----|
| 2 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Electric Hinge | TA2714-QC12 4-1/2" x 4-1/2" | US26D | MK |
| 1 Access Control Mort Lock | 21 H1-82271 24V LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |
| 1 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 1 Door Cable | MCC-DR 48" | | |

| | | | |
|----------------|-----------|--|----|
| 1 Power Supply | AQL6-R8E1 | | SU |
|----------------|-----------|--|----|

Notes: Integrated Wiegand card reader lockset. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the QC12 hinge. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. Door is monitored for REX and DPS.

Set: 107

Doors: F1109, F1115, F2113, F2208, F2216, F2217, F2219

| | | | |
|----------------------------|-----------------------------|-------|----|
| 2 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Electric Hinge | TA2714-QC12 4-1/2" x 4-1/2" | US26D | MK |
| 1 Access Control Mort Lock | 21 H1-82271 24V LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 3 Silencer | 608-RKW | | RO |
| 1 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 1 Door Cable | MCC-DR 48" | | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Integrated Wiegand card reader lockset. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the QC12 hinge. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. Door is monitored for REX and DPS.

Set: 108

Doors: F2209

| | | | |
|----------------------------|-----------------------------|-------|----|
| 2 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Electric Hinge | TA2714-QC12 4-1/2" x 4-1/2" | US26D | MK |
| 1 Access Control Mort Lock | 21 H1-82271 24V LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 3 Silencer | 608-RKW | | RO |
| 1 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 1 Door Cable | MCC-DR 48" | | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Integrated Wiegand card reader lockset. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the QC12 hinge. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. Door is monitored for REX and DPS.

Set: 109

Doors: 2834

| | | | |
|----------------------------|-----------------------------|-------|----|
| 4 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 2 Electric Hinge | TA2714-QC12 4-1/2" x 4-1/2" | US26D | MK |
| 2 Flush Bolt | 555 | US26D | RO |
| 1 Dust Proof Strike | 570 | US26D | RO |
| 1 Access Control Mort Lock | 21 H1-82271 24V LNJ GMK | US26D | SA |
| 2 Surface Closer | TB 351 O | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 2 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 20' | US32D | PE |
| 1 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 1 Door Cable | MCC-DR 48" | | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Integrated Wiegand card reader lockset on Active leaf monitoring REX and DPS. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the QC12 hinge. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. Inactive leaf monitored for DPS only.

Set: 110

Doors: F2102, F2202

| | | | |
|----------------------------|-----------------------------|-------|----|
| 5 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Electric Hinge | TA2714-QC12 4-1/2" x 4-1/2" | US26D | MK |
| 2 Flush Bolt | 555 | US26D | RO |
| 1 Dust Proof Strike | 570 | US26D | RO |
| 1 Access Control Mort Lock | 21 H1-82271 24V LNJ GMK | US26D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |

| | | | |
|----------------|-------------------------|--|----|
| 2 Silencer | 608-RKW | | RO |
| 1 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 1 Door Cable | MCC-DR 48" | | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Integrated Wiegand card reader lockset on Active leaf monitoring REX and DPS. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the QC12 hinge. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. Inactive leaf monitored for DPS only.

Set: 111

Doors: F1304.4

| | | | |
|----------------------------|-----------------------------|-------|----|
| 3 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Access Control Mort Lock | 10 21 H1-82271 24V LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Door Stop | 441 EXP | US26D | RO |
| 1 Threshold | 272A x 36" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 36" x 84" TKSP | US32D | PE |
| 1 Sweep | 315CN x 36" TKSP | US32D | PE |
| 1 Frame Cable | MCC-FR 75' 12 COND 20GA | US26D | |
| 1 Door Cable | MCC-DR 48" | US26D | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Integrated Wiegand card reader lockset. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the QC12 hinge. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. Door is monitored for REX and DPS.

Set: 112

Doors: 1858

| | | | |
|-------------------|-----------------------------|-------|----|
| 6 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Rim Exit Device | LD WS 8810 EO | US32D | SA |
| 1 Rim Exit Device | 10 21 WS 8804 ETJ GMK | US32D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |

| | | | |
|---------------|----------------------------|-------|----|
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 72" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 72" x 84" TKSP | US32D | PE |
| 2 Sweep | 315CN x 36" TKSP | US32D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |
| 2 Switch | 3287 | US32D | SA |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Both doors are monitored for DPS only.

Set: 113

Doors: F1210, F1304.1

| | | | |
|-------------------|-----------------------------|-------|----|
| 6 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Mullion | HCL980 | PC | SA |
| 1 Rim Exit Device | LD WS 8810 EO | US32D | SA |
| 1 Rim Exit Device | 10 21 WS 8804 ETJ GMK | US32D | SA |
| 1 Cylinder | 21 980C1 GMK | US26D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 36" | US32D | RO |
| 1 Threshold | 272A x 76" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 76" x 84" TKSP | US32D | PE |
| 2 Sweep | 315CN x 38" TKSP | US32D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |
| 2 Switch | 3287 | US32D | SA |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | US32D | |

Notes: Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Both doors are monitored for DPS only.

Set: 114

Doors: 1854, 1857, F1207.2

| | | | |
|-----------------------|-----------------------------|-------|----|
| 3 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Dormitory/Exit Lock | 10 21 8225 LNJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |

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| | | | |
|---------------|------------------------|-------|----|
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 36" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 36" x 84" TKSP | US32D | PE |
| 1 Sweep | 315CN x 36" TKSP | US32D | PE |
| 1 Switch | 3287 | US32D | SA |
| 1 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Door is monitored for DPS only.

Set: 115

Doors: 1845

| | | | |
|----------------------------|------------------------------|-------|----|
| 1 Electric Hinge, Hvy Wt | T4A3386-QC12 4-1/2" x 4-1/2" | US32D | MK |
| 2 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Access Control Mort Lock | 10 21 H1-82281 24V LNJ GMK | US26D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 40" | US32D | RO |
| 1 Threshold | 272A x 42" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 42" x 84" TKSP | US32D | PE |
| 1 Sweep | 315CN x 42" TKSP | US32D | PE |
| 1 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 1 Door Cable | MCC-DR 48" | | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Integrated Wiegand card reader lockset. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the QC12 hinge. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. Door is monitored for REX and DPS.

Set: 116

Doors: 124.3, 1919.3, 1950

| | | | |
|---------------------------|------------------------------|-------|----|
| 2 Electric Hinge, Hvy Wt | T4A3386-QC12 4-1/2" x 4-1/2" | US32D | MK |
| 4 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Mullion | HCL980 | PC | SA |
| 1 Access Control Rim Exit | 10 21 WS 56-H1-8804 ETJ GMK | US32D | SA |

| | | | |
|-------------------|-------------------------|-------|----|
| 1 Rim Exit Device | LD 55 WS 8810 ETJ | US32D | SA |
| 1 Cylinder | 21 980C1 GMK | US26D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 72" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 72" x 84" TKSP | US32D | PE |
| 1 Gasketing | 5110BL 120" | US32D | PE |
| 2 Sweep | 315CN x 36" TKSP | US32D | PE |
| 2 Switch | 3287 | US32D | SA |
| 2 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | | |
| 1 Door Cable | MCC-DR 48" | | |
| 2 Door Cable | MCC-DR 6" | | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Integrated Wiegand card reader exit on active leaf. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Both doors are monitored for REX and DPS. Active leaf has electrified latch retraction.

Set: 117

Doors: 106.3

| | | | |
|-------------------|-----------------------------|-------|----|
| 6 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Mullion | HCL980 | PC | SA |
| 1 Rim Exit Device | LD WS 8810 EO | US32D | SA |
| 1 Rim Exit Device | 10 21 WS 8804 ETJ GMK | US32D | SA |
| 1 Cylinder | 21 980C1 GMK | US26D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 72" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 72" x 84" TKSP | US32D | PE |
| 1 Gasketing | 5110BL 120" | US32D | PE |
| 1 Gasketing | S44BL 20' | US32D | PE |
| 1 Gasketing | S773BL 20' | US32D | PE |
| 2 Sweep | 315CN x 36" TKSP | US32D | PE |
| 2 Switch | 3287 | US32D | SA |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Added seals for sound attenuation. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Both doors are monitored for DPS only.

Set: 118

Doors: 2600.1, 2600.2

| | | | |
|---------------------------|-----------------------------|-------|----|
| 4 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 2 Electric Hinge | TA2714-QC12 4-1/2" x 4-1/2" | US26D | MK |
| 1 Mullion | L980S | PC | SA |
| 1 Rim Exit Device | LD 55 8810 ETJ | US32D | SA |
| 1 Access Control Rim Exit | 21 56-H1-8804 ETJ GMK | US32D | SA |
| 1 Cylinder | 21 980C1 GMK | US26D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | 5110BL 120" | PC | PE |
| 2 Silencer | 608-RKW | | RO |
| 2 Switch | 3287 | | SA |
| 2 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | | |
| 1 Door Cable | MCC-DR 48" | | |
| 2 Door Cable | MCC-DR 6" | | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Integrated Wiegand card reader exit on active leaf. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Both doors are monitored for REX and DPS. Active leaf has electrified latch retraction.

Set: 119

Doors: 1836.2

| | | | |
|---------------------------|-----------------------------|-------|----|
| 4 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 2 Electric Hinge | TA2714-QC12 4-1/2" x 4-1/2" | US26D | MK |
| 1 Mullion | L980S | PC | SA |
| 1 Access Control Rim Exit | 21 WS 56-H1-8804 ETJ GMK | US32D | SA |
| 1 Rim Exit Device | LD 55 8810 ETJ | US32D | SA |
| 1 Cylinder | 21 980C1 GMK | US26D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |

| | | | |
|----------------|-------------------------|-------|----|
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 20' | US32D | PE |
| 1 Gasketing | 5110BL 120" | PC | PE |
| 2 Switch | 3287 | US32D | SA |
| 2 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | | |
| 1 Door Cable | MCC-DR 48" | | |
| 2 Door Cable | MCC-DR 6" | | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Integrated Wiegand card reader exit on active leaf. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Both doors are monitored for REX and DPS. Active leaf has electrified latch retraction.

Set: 120

Doors: 1015, 1200.4

| | | | |
|--------------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Surface Vert Rod Exit | 21 NB8713 ETJ GMK | US32D | SA |
| 1 Surface Vert Rod Exit | NB8710 EO | US32D | SA |
| 2 Surface Closer | TB 351 P10 | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 2 Electromagnetic Holder | 998M | 689 | RF |
| 2 Armature | 900 | 689 | RF |
| 2 Spacer | 900-600 | 689 | RF |
| 1 Gasketing | S88D 20' | 689 | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | 689 | PE |

Notes: Magnetic Hold Opens must be tied into the buildings fire alarm system. Coordinate with the Electrical Subcontractor.

Set: 121

Doors: 1830, 1830.1, 1900.1, 1900.2, 1900.5, 1900.6

| | | | |
|-------------------------|-----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 2 Electric Hinge | TA2714-QC12 4-1/2" x 4-1/2" | US26D | MK |
| 2 Surface Vert Rod Exit | 12 21 59 8710 EO GMK | US32D | SA |
| 2 Surface Closer | TB 351 P10 | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |

| | | | | |
|---|------------------------|----------------------------|-------|----|
| 2 | Electromagnetic Holder | 998M | 689 | RF |
| 2 | Armature | 900 | 689 | RF |
| 2 | Spacer | 900-600 | 689 | RF |
| 1 | Gasketing | S88D 25' | US32D | PE |
| 2 | Astragal | 29324CNB x 96" Black Brush | 689 | PE |
| 2 | Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 2 | Door Cable | MCC-DR 48" | | |
| 1 | Power Supply | AQL6-R8E1 | | SU |

Notes: Delayed Egress System and Magnetic Hold Opens must be tied into the buildings fire alarm system. Coordinate with the Electrical Subcontractor.

Set: 122

Doors: 1800, 1800.1, 2800.1, 2800.2, 2800.3, 2800.4, 2900.1, 2900.2, 2900.3, 2900.4, 3400.1, 3400.2

| | | | | |
|---|------------------------|----------------------------|-------|----|
| 8 | Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 2 | Surface Vert Rod Exit | 12 NB8710 EO | US32D | SA |
| 2 | Surface Closer | TB 351 P10 | EN | SA |
| 2 | Kick Plate | K1050 8" x 34" | US32D | RO |
| 2 | Electromagnetic Holder | 998M | 689 | RF |
| 2 | Armature | 900 | 689 | RF |
| 2 | Spacer | 900-600 | 689 | RF |
| 1 | Gasketing | S88D 25' | 689 | PE |
| 2 | Astragal | 29324CNB x 96" Black Brush | 689 | PE |

Notes: Magnetic Hold Opens must be tied into the buildings fire alarm system. Coordinate with the Electrical Subcontractor.

Set: 123

Doors: 1901.1

| | | | | |
|---|------------------------|----------------------------|-------|----|
| 6 | Hinge, Full Mortise | TA2714xNRP 5" x 4-1/2" | US26D | MK |
| 1 | Surface Vert Rod Exit | 21 NB8713 ETJ GMK | US32D | SA |
| 1 | Surface Vert Rod Exit | NB8710 EO | US32D | SA |
| 2 | Surface Closer | TB 351 P10 | EN | SA |
| 2 | Kick Plate | K1050 8" x 46" | US32D | RO |
| 2 | Electromagnetic Holder | 998M | 689 | RF |
| 2 | Armature | 900 | 689 | RF |
| 2 | Spacer | 900-600 | 689 | RF |
| 2 | Astragal | 29324CNB x 84" Black Brush | 689 | PE |

| | | | |
|------------|---------|--|----|
| 2 Silencer | 608-RKW | | RO |
|------------|---------|--|----|

Notes: Magnetic Hold Opens must be tied into the buildings fire alarm system. Coordinate with the Electrical Subcontractor.

Set: 124

Doors: 1300.1, 1500.1, 1700.1, 2300, 2500, 2700, 3300

| | | | |
|--------------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714xNRP 5" x 4-1/2" | US26D | MK |
| 1 Surface Vert Rod Exit | 12 21 NB8713 ETJ GMK | US32D | SA |
| 1 Surface Vert Rod Exit | 12 NB8710 EO | US32D | SA |
| 2 Surface Closer | TB 351 P10 | EN | SA |
| 2 Kick Plate | K1050 8" x 46" | US32D | RO |
| 2 Electromagnetic Holder | 998M | 689 | RF |
| 2 Armature | 900 | 689 | RF |
| 2 Spacer | 900-600 | 689 | RF |
| 1 Gasketing | S88D 25' | 689 | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | 689 | PE |

Notes: Magnetic Hold Opens must be tied into the buildings fire alarm system. Coordinate with the Electrical Subcontractor.

Set: 125

Doors: 1422.1, 1422.3

| | | | |
|---------------------------|-----------------------------|-------|----|
| 4 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 2 Electric Hinge | TA2714-QC12 4-1/2" x 4-1/2" | US26D | MK |
| 1 Mullion | L980S | PC | SA |
| 1 Rim Exit Device | LD 55 8810 ETJ | US32D | SA |
| 1 Access Control Rim Exit | 21 56-H1-8804 ETJ GMK | US32D | SA |
| 1 Cylinder | 21 980C1 GMK | US26D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 20' | US26D | PE |
| 1 Gasketing | 5110BL 120" | US26D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |
| 2 Switch | 3287 | US26D | SA |
| 2 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | | |
| 1 Door Cable | MCC-DR 48" | | |

| | | | |
|----------------|-----------|--|----|
| 2 Door Cable | MCC-DR 6" | | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Integrated Wiegand card reader exit on active leaf. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Both doors are monitored for REX and DPS. Active leaf has electrified latch retraction.

Set: 126

Doors: F1101.2, F2100.S, F2200.S

| | | | |
|---------------------------|-----------------------------|-------|----|
| 2 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Electric Hinge | TA2714-QC12 4-1/2" x 4-1/2" | US26D | MK |
| 1 Access Control Rim Exit | 21 56-H1-8804 ETJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 3 Silencer | 608-RKW | | RO |
| 1 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 1 Door Cable | MCC-DR 48" | | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Integrated Wiegand card reader exit. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the QC12 hinge. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. Door is monitored for REX and DPS.

Set: 127

Doors: 1321.1, 1501.1, 1529.1, 1701.1, 1802, 1824.1, 2100, 2212, 2319, 2501, 2515, 2527, 2701, 2719, 2802, 2820, 3105, 3218, 3319, 3402, 3420

| | | | |
|--------------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Surface Vert Rod Exit | 12 NB8710 EO | US32D | SA |
| 1 Surface Vert Rod Exit | 12 NB8715 ETJ | US32D | SA |
| 2 Surface Closer | TB 351 P10 | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 2 Electromagnetic Holder | 998M | 689 | RF |
| 2 Armature | 900 | 689 | RF |
| 2 Spacer | 900-600 | 689 | RF |

| | | | |
|-------------|----------------------------|-----|----|
| 1 Gasketing | S88D 20' | 689 | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | 689 | PE |

Notes: Magnetic Hold Opens must be tied into the buildings fire alarm system. Coordinate with the Electrical Subcontractor.

Set: 128

Doors: 1020.1, 1115.1, 1515.1, 1731.1

| | | | |
|--------------------------|----------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Rim Exit Device | 12 8815 ETJ | US32D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Electromagnetic Holder | 998M | 689 | RF |
| 1 Armature | 900 | 689 | RF |
| 1 Spacer | 900-600 | 689 | RF |
| 1 Gasketing | S88D 17' | US32D | PE |

Notes: Magnetic Hold Opens must be tied into the buildings fire alarm system. Coordinate with the Electrical Subcontractor.

Set: 129

Doors: 102.1, 120.1, 202, 220, F1200.S1

| | | | |
|-----------------------|----------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Rim Exit Device | 12 8815 ETJ | US32D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 130

Doors: F1100.S1

| | | | |
|--------------------------------|----------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Rim Exit Device | 12 8815 ETJ | US32D | SA |
| 1 Surface Overhead Holder/Stop | 9-336 | 689 | RF |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 131

Doors: 2908

| | | | |
|-----------------------|----------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Rim Exit Device | AL 12 8810 EO | US32D | SA |
| 1 Surface Closer | TB 351 O | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Notes: Door to have a stand alone Alarmed exit device. Alarm sounds immediately upon rail depression. Signage to be provided indicating door is for emergency exit only.

Set: 132

Doors: 1501.2, 1701.2, 1919.2

| | | | |
|-------------------|-----------------------------|-------|----|
| 6 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Mullion | HCL980 | PC | SA |
| 2 Rim Exit Device | LD WS 8810 EO | US32D | SA |
| 1 Cylinder | 21 980C1 GMK | US26D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 72" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 72" x 84" TKSP | US32D | PE |
| 1 Gasketing | 5110BL 120" | US32D | PE |
| 2 Sweep | 315CN x 36" TKSP | US26D | PE |
| 2 Switch | 3287 | US32D | SA |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Both doors are Exit Only and monitored for DPS only.

Set: 133

Doors: 102.2, 120.2

| | | | |
|-------------------|-----------------------------|-------|----|
| 3 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Rim Exit Device | LD WS 8810 EO | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |

| | | | |
|---------------|------------------------|-------|----|
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 36" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 36" x 84" TKSP | US32D | PE |
| 1 Sweep | 315CN x 36" TKSP | US32D | PE |
| 1 Switch | 3287 | US32D | SA |
| 1 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Door is Exit Only and monitored for DPS only.

Set: 134

Doors: 106.4

| | | | |
|-------------------|-----------------------------|-------|----|
| 3 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Rim Exit Device | LD WS 8810 EO | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 36" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 36" x 84" TKSP | US32D | PE |
| 1 Sweep | 315CN x 36" TKSP | US32D | PE |
| 1 Switch | 3287 | US32D | SA |
| 1 Frame Cable | MCC-FR 75' 2 COND DPS | US32D | |

Notes: Added seals for sound attenuation. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Door is Exit Only and monitored for DPS only.

Set: 135

Doors: 1853.1, 1925

| | | | |
|-------------------|-----------------------------|-------|----|
| 3 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Rim Exit Device | LD WS 8810 EO | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 40" | US32D | RO |
| 1 Threshold | 272A x 42" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 42" x 84" TKSP | US32D | PE |
| 1 Sweep | 315CN x 42" TKSP | US32D | PE |

| | | | |
|---------------|-----------------------|-------|----|
| 1 Switch | 3287 | US32D | SA |
| 1 Frame Cable | MCC-FR 75' 2 COND DPS | US32D | |

Notes: Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Door is Exit Only and monitored for DPS only.

Set: 136

Doors: F1200.S2

| | | | |
|---------------------------|------------------------------|-------|----|
| 1 Electric Hinge, Hvy Wt | T4A3386-QC12 4-1/2" x 4-1/2" | US32D | MK |
| 2 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Access Control Rim Exit | 10 21 WS 56-H1-8804 ETJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 36" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 36" x 84" TKSP | US32D | PE |
| 1 Sweep | 315CN x 36" TKSP | US32D | PE |
| 1 Frame Cable | MCC-FR 75' 12 COND 20GA | | |
| 1 Door Cable | MCC-DR 48" | | |
| 1 Door Cable | MCC-DR 6" | US26D | |
| 1 Power Supply | AQL6-R8E1 | | SU |

Notes: Integrated Wiegand card reader exit with electrified latch retraction. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Door is monitored for REX and DPS.

Set: 137

Doors: 1422.2

| | | | |
|-------------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Surface Vert Rod Exit | 21 NB8706 ETJ GMK | US32D | SA |
| 1 Surface Vert Rod Exit | NB8710 EO | US32D | SA |
| 2 Surface Closer | TB 351 P10 | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 2 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 20' | US32D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |

| | | | |
|---------------|-----------------------|-------|----|
| 2 Switch | 3287 | US32D | SA |
| 2 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Provide SCCPSS standard Molex 'Plug n Play' connectivity to the SER-12 current transfer. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. Both doors are monitored for REX and DPS. Active leaf has electrified latch retraction.

Set: 138

Doors: 1901.2

| | | | |
|--------------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714xNRP 5" x 4-1/2" | US26D | MK |
| 2 Surface Vert Rod Exit | 12 NB8710 EO | US32D | SA |
| 2 Surface Closer | TB 351 P10 | EN | SA |
| 2 Kick Plate | K1050 8" x 46" | US32D | RO |
| 2 Electromagnetic Holder | 998M | 689 | RF |
| 2 Armature | 900 | 689 | RF |
| 2 Spacer | 900-600 | 689 | RF |
| 1 Gasketing | S88D 25' | US32D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |

Notes: Magnetic Hold Opens must be tied into the buildings fire alarm system. Coordinate with the Electrical Subcontractor.

Set: 139

Doors: 1403.4

| | | | |
|------------------------|-----------------------------|-------|----|
| 4 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 2 Electric Hinge | TA2714-QC12 4-1/2" x 4-1/2" | US26D | MK |
| 1 Mullion | L980S | PC | SA |
| 1 Rim Exit Device | 21 59 8810 EO GMK | US32D | SA |
| 1 Electrified Rim Exit | 21 59 8876-24v ETJ GMK | US32D | SA |
| 1 Cylinder | 21 980C1 GMK | US26D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 20' | US32D | PE |
| 1 Gasketing | 5110BL 120" | US26D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |
| 2 Switch | 3287 | US32D | SA |

| | | | | |
|---|---------------------|-------------------------|------|----|
| 2 | Frame Cable | MCC-FR 75' 12 COND 20GA | EN | |
| 2 | Frame Cable | MCC-FR 75' 2 COND DPS | EN | |
| 1 | Door Cable | MCC-DR 48" | EN | |
| 2 | Electronic Controls | 5395G | GREY | |
| 1 | Power Supply | AQL6-R8E1 | | SU |

Notes: Delayed Egress System and Magnetic Hold Opens must be tied into the buildings fire alarm system. Wall mounted card readers on both sides of the opening. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the SER-12 current transfer. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. Both doors are monitored for DPS.

Card readers are wall mounted and on both sides of the door.

Set: 140

Doors: 1604.1

| | | | | |
|---|----------------------|-----------------------------|-------|----|
| 2 | Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 | Electric Hinge | TA2714-QC12 4-1/2" x 4-1/2" | US26D | MK |
| 1 | Electrified Rim Exit | 21 59 8876-24v ETJ GMK | US32D | SA |
| 1 | Surface Closer | TB 351 P10 | EN | SA |
| 1 | Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 | Wall Stop | 409 | US32D | RO |
| 1 | Gasketing | S88D 17' | US32D | PE |
| 1 | Switch | 3287 | US32D | SA |
| 1 | Frame Cable | MCC-FR 75' 12 COND 20GA | US32D | |
| 1 | Frame Cable | MCC-FR 75' 2 COND DPS | US32D | |
| 1 | Door Cable | MCC-DR 48" | US32D | |
| 1 | Electronic Controls | 6005BKB00 | BLACK | |
| 1 | Power Supply | AQL6-R8E1 | | SU |

Notes: Delayed Egress System must be tied into the buildings fire alarm system. Provide SCCPSS standard Molex 'Plug n Play' connectivity to the SER-12 current transfer. Coordinate wiring with the Division 26 Subcontractor. Power supply cannot be located beyond the extents of the 75' 12-conductor cable to avoid a voltage drop. Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the power supply location, excess coiled neatly, tie wrapped together and strapped to the wall next to the power supply. Door is monitored for DPS.

Set: 141

Doors: F1201.1, F1202.2

| | | | |
|-------------------|-----------------------------|-------|----|
| 3 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Rim Exit Device | 10 16 21 WS 8813 ETJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 36" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 36" x 84" TKSP | US32D | PE |
| 1 Sweep | 315CN x 36" TKSP | US32D | PE |
| 1 Switch | 3287 | US32D | SA |
| 1 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Door is monitored for DPS only.

Set: 142

Doors: F1201.2, F1202.1

| | | | |
|-------------------|-----------------------------|-------|----|
| 3 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Rim Exit Device | 10 16 21 WS 8813 ETJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 38" | US32D | RO |
| 1 Threshold | 272A x 40" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 40" x 84" TKSP | US32D | PE |
| 1 Sweep | 315CN x 40" TKSP | US32D | PE |
| 1 Switch | 3287 | US32D | SA |
| 1 Frame Cable | MCC-FR 75' 2 COND DPS | US32D | |

Notes: Termination of all low voltage cables to be provided by the SCCPSS's vendor. All cables scheduled under this set shall be run to the DPS junction box. This junction box shall be located above the door in an accessible location above the ceiling, excess DPS cable shall be pulled into the junction box coiled neatly, tie wrapped together. Door is monitored for DPS only.

Set: 143

Doors: 1403.1, 1403.2

| | | | |
|-----------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Mullion | L980S | PC | SA |
| 1 Rim Exit Device | 21 8813 ETJ GMK | US32D | SA |
| 1 Rim Exit Device | 8810 ETJ | US32D | SA |

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| | | | |
|------------------|----------------------------|-------|----|
| 1 Cylinder | 21 980C1 GMK | US26D | SA |
| 2 Surface Closer | TB 351 P10 | EN | SA |
| 2 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | 5110BL 120" | US26D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |
| 2 Silencer | 608-RKW | | RO |

Set: 144

Doors: 1205.1, 1205.2, 2403.8, 2412.1

| | | | |
|-----------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Mullion | L980S | PC | SA |
| 1 Rim Exit Device | 21 8813 ETJ GMK | US32D | SA |
| 1 Rim Exit Device | 8810 ETJ | US32D | SA |
| 1 Cylinder | 21 980C1 GMK | US26D | SA |
| 2 Surface Closer | TB 351 P10 | EN | SA |
| 2 Wall Stop | 409 | US32D | RO |
| 1 Gasketing | S88D 20' | US32D | PE |
| 1 Gasketing | 5110BL 120" | US26D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |

Set: 145

Doors: 106.1

| | | | |
|-------------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Surface Vert Rod Exit | 21 NB8713 ETJ GMK | US32D | SA |
| 1 Surface Vert Rod Exit | NB8710 EO | US32D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S44BL 20' | US26D | PE |
| 1 Gasketing | S773BL 20' | US26D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | EN | PE |

Notes: Added seals for sound attenuation.

Set: 146

Doors: 2203.2

| | | | |
|-------------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Surface Vert Rod Exit | 21 NB8713 ETJ GMK | US32D | SA |

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| | | | |
|-------------------------|----------------------------|-------|----|
| 1 Surface Vert Rod Exit | NB8710 EO | US32D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 28" | US32D | RO |
| 1 Gasketing | S88D 20' | EN | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | EN | PE |

Set: 147

Doors: 124.1, 1403.3, 1836.1

| | | | |
|-----------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Mullion | L980S | PC | SA |
| 1 Rim Exit Device | 21 8813 ETJ GMK | US32D | SA |
| 1 Rim Exit Device | LD 8810 ETJ | US32D | SA |
| 1 Cylinder | 21 980C1 GMK | US26D | SA |
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 20' | US32D | PE |
| 1 Gasketing | 5110BL 120" | US26D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |

Set: 148

Doors: 1607.1

| | | | |
|-------------------------|----------------------------|-------|----|
| 6 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Surface Vert Rod Exit | 12 21 NB8713 ETJ GMK | US32D | SA |
| 1 Surface Vert Rod Exit | 12 NB8710 EO | US32D | SA |
| 2 Surface Closer | TB 351 P10 | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 2 Wall Stop | 409 | US32D | RO |
| 2 Gasketing | S88D 20' | US32D | PE |
| 2 Astragal | 29324CNB x 84" Black Brush | US32D | PE |

Notes: Doors to open 180 deg.

Set: 149

Doors: 1604.3, 1604.5

| | | | |
|-------------------------|----------------------------|-------|----|
| 8 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Surface Vert Rod Exit | 12 21 NB8713 ETJ GMK | US32D | SA |
| 1 Surface Vert Rod Exit | 12 NB8710 EO | US32D | SA |

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| | | | |
|------------------|----------------------------|-------|----|
| 2 Surface Closer | TB 351 CPS | EN | SA |
| 2 Kick Plate | K1050 8" x 34" | US32D | RO |
| 2 Gasketing | S88D 25' | US32D | PE |
| 2 Astragal | 29324CNB x 96" Black Brush | US32D | PE |

Set: 150

Doors: 1860, F1305.1

| | | | |
|-----------------------|----------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Rim Exit Device | 12 21 8804 ETJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 151

Doors: 113.1, 213.1

| | | | |
|-----------------------|------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714 4-1/2" x 4-1/2" | US26D | MK |
| 1 Rim Exit Device | 21 8804 ETJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 152

Doors: 2602, 2604

| | | | |
|-----------------------|----------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Rim Exit Device | 12 21 8813 ETJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 153

Doors: 1604.8

| | | | |
|-----------------------|----------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Rim Exit Device | 12 8810 EO | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 154

Doors: F2205.2

| | | | |
|-----------------------|----------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Rim Exit Device | 21 8813 ETJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 3 Silencer | 608-RKW | | RO |

Set: 155

Doors: 2203.1, 2401, 2401.7, 2403, 2410, 2410.2, 2412.2

| | | | |
|-----------------------|----------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Rim Exit Device | 21 8813 ETJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S88D 17' | US32D | PE |

Set: 156

Doors: 106.2

| | | | |
|-----------------------|----------------------------|-------|----|
| 3 Hinge, Full Mortise | TA2714xNRP 4-1/2" x 4-1/2" | US26D | MK |
| 1 Rim Exit Device | 21 8813 ETJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Gasketing | S773BL 17' | US32D | PE |
| 1 Gasketing | S44BL 17' | US32D | PE |

Notes: Added seals for sound attenuation.

Set: 157

Doors: FG1, FG2

| | | | |
|-------------------|-----------------------|-------|----|
| 1 Rim Exit Device | 10 16 21 8804 ETJ GMK | US32D | SA |
| 1 Switch | 3287 | US32D | SA |
| 1 Frame Cable | MCC-FR 75' 2 COND DPS | | |

Notes: Balance of hardware by door supplier.

Set: 158

Doors: FG3

| | | | |
|-------------------|-----------------------|-------|----|
| 1 Rim Exit Device | 10 16 21 8804 ETJ GMK | US32D | SA |
|-------------------|-----------------------|-------|----|

Notes: Balance of hardware by door supplier.

Set: 159

Doors: 106.5, 115.3, 124.4, 124.5, 124.6, 1840.1, 1840.2, 1850.3, 1850.4, F1301.2, F1304.2, F1304.3

All hardware provided by the door supplier.

Set: 160

Not Used

Set: 161

Doors: F1305

| | | | |
|-------------------|-----------------------------|-------|----|
| 3 Hinge, Hvy Wt | T4A3386xNRP 4-1/2" x 4-1/2" | US32D | MK |
| 1 Rim Exit Device | 10 21 WS 8804 ETJ GMK | US32D | SA |
| 1 Surface Closer | TB 351 CPS | EN | SA |
| 1 Kick Plate | K1050 8" x 34" | US32D | RO |
| 1 Threshold | 272A x 36" MSES10 | US32D | PE |
| 1 Gasketing | 303AS x 36" x 84" TKSP | US32D | PE |
| 1 Sweep | 315CN x 36" TKSP | US32D | PE |
| 1 Switch | 3287 | US32D | SA |
| 1 Frame Cable | MCC-FR 75' 2 COND DPS | US32D | |

Set: 162

Doors: X-KEY

| | | | |
|---------------|----------------|----------------|----|
| 6 Knox Box | 3275 FD | Dark Bronze | |
| 6 Knox Box | 3275 SCCPSS PD | Dark Bronze | |
| 2 Key Cabinet | 1205-A | US32D | LU |

END OF SECTION 08 71 00

C.

SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Glass products.
 - 2. Laminated glass.
 - 3. Insulating glass.
 - 4. Glazing tapes.
 - 5. Miscellaneous glazing materials.
- B. Related Requirements:
 - 1. Section 08 87 33 "Architectural Window Film."

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters in accordance with ASTM C1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

1.4 COORDINATION

- A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review temporary protection requirements for glazing during and after installation.

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Glass Samples: For each type of the following products; 12 inches square.
 1. Laminated glass.
 2. Insulating glass.
- C. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturers of fabricated glass units].
- B. Product Certificates: For glass.
- C. Preconstruction adhesion and compatibility test report.
- D. Sample Warranties: For special warranties.

1.8 QUALITY ASSURANCE

- A. Fabricated-Glass Manufacturer Qualifications: A qualified manufacturer of fabricated glass units who is approved and certified by primary glass manufacturer.
- B. Installer Qualifications: A qualified glazing contractor for this Project who is certified under the North American Contractor Certification Program (NACC) for Architectural Glass & Metal (AG&M) contractors.
- C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- D. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.

1. Install glazing in mockups specified in Section 08 41 13 "Aluminum-Framed Entrances and Storefronts" Section 08 51 13 "Aluminum Windows" to match glazing systems required for Project, including glazing methods.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials in accordance with manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F.

1.11 WARRANTY

- A. Manufacturer's Special Warranty for Laminated Glass: Manufacturer agrees to replace laminated-glass units that deteriorate within specified warranty period. Deterioration of laminated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
 1. Warranty Period: Manufacturer's standard or minimum 10 years after date of Final Acceptance, whichever is greater.
- B. Manufacturer's Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is obstruction of vision by dust, moisture, or film on interior surfaces of glass.
 1. Warranty Period: Manufacturer's standard or minimum 10 years after date of Final Acceptance, whichever is greater.

PART 2 - PRODUCTS**2.1 MANUFACTURERS**

- A. Source Limitations for Glass: Obtain glass from single source from single manufacturer.
- B. Source Limitations for Glazing Accessories: For each product and installation method, obtain from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design glazing.
- C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined in accordance with the IBC and ASTM E1300:
 - 1. Design Wind Pressures: As indicated on Drawings.
 - 2. Design Snow Loads: As indicated on Drawings.
 - 3. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.
- D. Windborne-Debris-Impact Resistance: Exterior glazing shall pass ASTM E1886 missile-impact and cyclic-pressure tests in accordance with ASTM E1996 for Wind Zone 2 for basic protection.
 - 1. Large-Missile Test: For glazing located within 30 feet of grade.
 - 2. Small-Missile Test: For glazing located between 30 feet and 60 feet above grade.
- E. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.
- F. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
 - 1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
 - 2. For laminated-glass lites, properties are based on products of construction indicated.
 - 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 - 4. U-Factors: Center-of-glazing values, in accordance with NFRC 100 and based on LBL's WINDOW 7 computer program, expressed as Btu/sq. ft. x h x deg F.

5. SHGC and Visible Transmittance: Center-of-glazing values, in accordance with NFRC 200 and based on LBL's WINDOW 7 computer program.
6. Visible Reflectance: Center-of-glazing values, in accordance with NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
 1. NGA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
 2. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C1036, Type I, Class 1 (clear), Quality-Q3.
 1. Manufacturers: Subject to compliance, provide products from one of the following:
 - a. AGC Glass North America
 - b. Guardian Glass
 - c. Vitro Architectural Glass
 - d. Oldcastle BuildingEnvelope
 - e. Trulite Glass & Aluminum Solutions
- B. Fully Tempered Float Glass: ASTM C1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.5 LAMINATED GLASS

- A. Windborne-Debris-Impact-Resistant Laminated Glass: Comply with requirements specified above for laminated glass except laminate glass with one of the following to comply with interlayer manufacturer's written instructions:
1. Manufacturers: Subject to compliance, provide products from one of the following:
 - a. Guardian Glass
 - b. Oldcastle BuildingEnvelope
 - c. Trulite Glass & Aluminum Solutions
 - d. Vitro Architectural Glass
 - e. AGC Glass North America
 2. Construction: Laminate glass with polyvinyl butyral interlayer reinforced with polyethylene terephthalate film to comply with interlayer manufacturer's written instructions.
 3. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 4. Interlayer Color: Clear unless otherwise indicated.

2.6 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified in accordance with ASTM E2190.
1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
 2. Perimeter Spacer: Manufacturer's standard spacer material and construction.
 - a. Manufacturers: Subject to compliance, provide products from one of the following:
 - 1) Guardian Glass
 - 2) Oldcastle BuildingEnvelope
 - 3) Trulite Glass & Aluminum Solutions
 - 4) Vitro Architectural Glass
 - 5) AGC Glass North America

2.7 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.

3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:

1. AAMA 810.1, Type 1, for glazing applications in which tape acts as primary sealant.
2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, recommended in writing by manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

- C. Setting Blocks:

1. EPDM or Silicone or Neoprene with Shore A durometer hardness of 85, plus or minus 5.
2. Type recommended in writing by sealant or glass manufacturer.

- D. Spacers:

1. Neoprene blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
2. Type recommended in writing by sealant or glass manufacturer.

- E. Edge Blocks:

1. EPDM or Silicone or Neoprene with Shore A durometer hardness per manufacturer's written instructions.
2. Type recommended in writing by sealant or glass manufacturer.

- F. Cylindrical Glazing Sealant Backing: ASTM C1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.9 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches.
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch- minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and in accordance with requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended in writing by gasket manufacturer.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended in writing by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

3.6 CLEANING AND PROTECTION

- A. Immediately after installation, remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
 - 1. If, despite such protection, contaminating substances do contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.
- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.7 MONOLITHIC GLASS SCHEDULE

- A. Clear Glass Type G1 and G2: Fully tempered float glass as required.

1. Minimum Thickness: 6 mm.
2. Safety glazing required.
3. Refer to Specification Section 08 87 33 ARCHITECTURAL WINDOW FILM for Type G2 glass.

3.8 INSULATING-LAMINATED-GLASS SCHEDULE

A. Low-E-Coated, Clear Insulating Glass Type IG1 & IG3:

1. Basis-of-Design Product: AGC Glass Energy Select 28.
2. Overall Unit Thickness: 1-5/16".
3. Glass Performance:
 - a. U-Factor: 0.26 maximum.
 - b. Visible Light Transmittance: 0.61 minimum.
 - c. SGHC: 0.28 maximum.
4. Calculated System Performance:
 - a. U-Factor: 0.39 maximum.
 - b. Visible Light Transmittance: 0.52 minimum.
 - c. SGHC: 0.25 maximum.
5. Safety glass required.
6. Refer to Specification Section 08 87 33 ARCHITECTURAL WINDOW FILM for Type IG3 glass.

B. Low-E-Coated, Clear Insulating Glass Type IG2:

1. Basis-of-Design Product: AGC Glass Energy Select 28.
2. Overall Unit Thickness: 1".
3. Glass Performance:
 - a. U-Factor: 0.26 maximum.
 - b. Visible Light Transmittance: 0.61 minimum.
 - c. SGHC: 0.28 maximum.
4. Calculated System Performance:
 - a. U-Factor: 0.43 maximum.
 - b. Visible Light Transmittance: 0.55 minimum.
 - c. SGHC: 0.25 maximum.
5. Safety glass required.

C. Low-E-Coated, Clear Insulating Glass Type Model 50D (storefront entrance):

1. Basis-of-Design Product: AGC Glass Energy Select 28.
2. Overall Unit Thickness: 1".

3. Glass Performance:
 - a. U-Factor: 0.26 maximum.
 - b. Visible Light Transmittance: 0.62 minimum.
 - c. SGHC: 0.28 maximum.

4. Calculated System Performance:
 - a. U-Factor: 0.76 maximum.
 - b. Visible Light Transmittance: 0.29 minimum.
 - c. SGHC: 0.18 maximum.

5. Safety glass required.

D. Uncoated Polycarbonate Sheet Type LX:

1. Product provided by Ticket Window Manufacturer.
2. Overall Unit Thickness: 3/4".
3. Color: Clear.
- 4.

END OF SECTION 08 80 00

SECTION 08 87 33 – ARCHITECTURAL WINDOW FILM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. The General Conditions, Supplementary Conditions, and Division 01 – General Requirements apply.

1.2 SECTION INCLUDES

- A. Decorative Window Film
- B. Exterior Window Film

1.3 RELATED SECTIONS

- A. Section 08 80 00 - Glazing: Substrate for application of decorative film.

1.4 REFERENCES

- A. ASTM International (ASTM):
 - 1. ASTM E903 - Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres.

1.5 DEFINITIONS

- A. Visible Light Transmittance: The ratio of the amount of visible light (380-780 nm) that is allowed to pass through a glazing system to the amount of visible light falling on the glazing system. The value is expressed as a percentage.
- B. Diffuse Visible Light Reflectance (exterior): The percentage of visible light falling on a flat, non-mirrored surface that is neither transmitted nor absorbed but scattered backwardly at random angles from that surface. This value is also known as “non-specular reflectance”.
- C. Privacy Film Rating: This number, between 0 (clear) and 10 (opaque), represents the relative difficulty an observer has in identifying the nature and character of an object located on the opposite side of the window, with the observer and the object both located at least 2 feet from the pane upon which the product has been installed.
- D. Specialty Series: These films mask light, add privacy, or give a pop of color to any space. Bold, graphic hues and distinctive designs enliven retail spaces and commercial properties. Unique combinations of specialty films allow for endless customizable possibilities.

1.6 PERFORMANCE REQUIREMENTS

- A. Provide Decorative films that do not have a masking sheet.

1.7 SUBMITTALS

- A. Product Data: Submit for each product specified indicating:
 - 1. Performance properties.
 - 2. Preparation and installation instructions and recommendations.
 - 3. Storage and handling recommendations.
- B. Samples: For each type of decorative film specified, two (2) samples, 12 inches square.
- C. Qualification Data: Submit documentation indicating qualifications of decorative film manufacturer.
- D. Operation and Maintenance Data: Submit for decorative film to include in maintenance manuals.
- E. Warranty: Submit sample special warranty specified in this section.

1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that has a minimum of 5 years of documented experience manufacturing decorative films similar to be used for this project.
- B. Installer Qualifications: A firm that is authorized by decorative film manufacturer to install film in accordance with guidelines set forth by the manufacturer.
- C. Source Limitations: Obtain each type of decorative film from same manufacturer.
- D. Pre-installation Conference: Conduct conference at project site to discuss methods and procedures relating to installation of the decorative films.

1.9 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle materials in manufacturer's protective packaging.
- B. Store and protect materials according to manufacturer's written recommendations to prevent damage from condensation, temperature changes, direct exposure to sun, or other causes.

1.10 SITE CONDITIONS

- A. Ambient Conditions: Maintain temperature, humidity, and ventilation within limits recommended by manufacturer.

PART 2 - PRODUCTS

2.1 DECORATIVE WINDOW FILM (Glass Type G2)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. 3M
 2. Avery
 3. FDC Graphic Films, Inc.
 4. The Kennickel Group
 5. LLumar
 6. Solyx Films, LLC
- B. Decorative Film: shall have the following performance characteristics when applied to the interior surface of single-pane, 1/8-inch clear glass:
1. % Visible Light Transmission: 34
 2. % Diffuse Visible Light Reflectance (exterior): 48
 3. Privacy Film Rating: 9
 4. Thickness without Liner: 0.003 inches
 5. Film Color: Custom pattern

2.2 DECORATIVE FILM ACCESSORIES

- A. General: Provide accessories either manufactured by or acceptable to Decorative film manufacturer for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Pressure Sensitive Adhesive: This adhesive is activated by pressure and water. It is characterized by its permanently tacky nature and its installation ease.
- C. Cleaners, Primers, and Sealers: Types recommended by film manufacturer.

2.3 EXTERIOR WINDOW FILM (Glass Type IG3)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. 3M
 2. Avery
 3. FDC Graphic Films, Inc.
 4. The Kennickel Group
 5. LLumar
 6. Solyx Films, LLC
- B. Material Properties:

1. General: Glass finish field-applied application to glass as visual opaque film on interior side.
 2. Film: Vinyl.
 3. Adhesive: Acrylic, pressure-sensitive, permanent.
 4. Liner: Silicone-coated polyester.
 5. Thickness (film and adhesive without liner):
 - a. Frosted: 4.7 mils (120 microns)
 6. Fire performance: Surface burning characteristics when tested in accordance with ASTM E-84, Class A:
 - a. Flame Spread: 25 maximum.
 - b. Smoke developed: 450 maximum.
- C. Optical Performance:
1. Frosted decorative / privacy glazing film:
 - a. Ultraviolet transmittance (ASTM E903): 20%.
 - b. Visible light transmittance (ASTM E903, ASTM E308): 72%
 - c. Visible light reflectance (ASTM E903): 12%
 - d. Shading Coefficient at 90 Degrees (Normal Incidence) (ASTM E 903): 0.82.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates for compliance with requirements and for conditions affecting performance of Decorative film including glass that is broken, chipped, cracked, abraded, or damaged in any way.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates thoroughly prior to installation.
- C. Prepare substrates using methods recommended by film manufacturer to achieve the best results for the substrate under project conditions.
- D. Protect window frames and surrounding surfaces to prevent damage during installation.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's written instructions.
- B. Install with no gaps or overlaps.
- C. If seamed, make seams non-overlapping.
- D. Do not remove release liner from film until just before each piece of film is cut and ready for installation.
- E. Custom cut to the glass with neat, square corners and edges to within 1/8-inch of the window frame.
- F. Remove air bubbles, blisters, and other defects. Be careful to remove "fingers" to eliminate any contamination or excess water pockets. It is crucial to remove as much water as possible during installation.

3.4 FIELD QUALITY CONTROL

- A. After installation, view film from a distance of 10 feet against a bright uniform sky or background. Film shall appear uniform in appearance with no visible streaks, wrinkles, banding, thin spots or pinholes.
- B. If installed film does not meet these criteria, remove and replace with new film.

3.5 CLEANING AND PROTECTION

- A. Remove excess mounting solution at finished seams, perimeter edges, and adjacent surfaces.
- B. Use cleaning methods recommended by film manufacturer.
- C. Replace films that cannot be cleaned.
- D. Protect installed products until completion of project.
- E. Touch-up, repair or replace damaged products before substantial completion.
- F.
- G. END OF SECTION 08 87 33

SECTION 08 91 19 - FIXED LOUVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Fixed extruded-aluminum louvers.

1.3 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades (i.e., the axis of the blades are horizontal).
- C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.

1.4 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.5 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.6 WARRANTY

- A. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.
 - 1. Deterioration includes, but is not limited to, the following:

- a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
2. Warranty Period: Five years from date of Material Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain fixed louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- B. Windborne-Debris-Impact Resistance: Louvers located within 30 feet of grade shall pass enhanced protection, when tested according to AMCA 540.
- C. Seismic Performance: As indicated on drawings.
- D. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- F. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

2.3 FIXED EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal Drainable-Blade Louver:
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Airolite (Basis-of-Design Product: Airolite K6776).

- b. All-Lite Architectural Products.
 - c. Industrial Louvers, Inc.
- 2. Louver Depth: 6 inches.
 - 3. Frame and Blade Nominal Thickness: As required to comply with structural performance requirements, but not less than 0.080 inch for blades and 0.080 inch for frames
 - 4. Mullion Type: Concealed.
 - 5. Louver Performance Ratings:
 - a. Free Area: Minimum 50 percent.
 - b. Air Volume Flow Rate at Beginning Point of Water Penetration: 10,700 cfm.
 - c. Pressure Drop at Beginning Point of Water Penetration: 0.19 in H₂O.

2.4 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
 - 1. Screen Location for Fixed Louvers: Interior face.
 - 2. Screening Type: Bird screening.
- B. Secure screen frames to louver frames with machine screws with heads finished to match louver, spaced a maximum of 6 inches from each corner and at 12 inches o.c.
- C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.
 - 1. Metal: Same type and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
 - 2. Finish: Same finish as louver frames to which louver screens are attached.
- D. Louver Screening for Aluminum Louvers:
 - 1. Bird Screening: Aluminum, 1/2-inch- square mesh, 0.063-inch wire.

2.5 BLANK-OFF PANELS

- A. Insulated Blank-Off Panels: Laminated panels consisting of an insulating core surfaced on back and front with metal sheets and attached to back of louver.
 - 1. Thickness: 1 inch.
 - 2. Metal Facing Sheets: Aluminum sheet, not less than 0.032-inch nominal thickness.
 - 3. Insulating Core: extruded-polystyrene foam.
 - 4. Edge Treatment: Trim perimeter edges of blank-off panels with louver manufacturer's standard extruded-aluminum-channel frames, not less than 0.080-inch nominal thickness, with corners mitered and with same finish as panels.
 - 5. Seal perimeter joints between panel faces and louver frames with gaskets or sealant.
 - 6. Panel Finish: Same type of finish applied to louvers, but black color.

2.6 MATERIALS

- A. Aluminum Extrusions: ASTM B221, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B209, Alloy 3003 or 5005, with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
 - 1. Use Phillips flat-head screws for exposed fasteners unless otherwise indicated.
 - 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 - 3. For color-finished louvers, use fasteners with heads that match color of louvers.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.7 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.
 - 1. Continuous Vertical Assemblies: Fabricate units without interrupting blade-spacing pattern unless horizontal mullions are indicated.
 - 2. Horizontal Mullions: Provide horizontal mullions at joints where indicated.
- C. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 - 1. Frame Type: Channel unless otherwise indicated.
- E. Include supports, anchorages, and accessories required for complete assembly.
- F. Join frame members to each other and to fixed louver blades with fillet welds concealed from view unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.8 ALUMINUM FINISHES

- A. Finish louvers after assembly.

- B. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Protect unpainted galvanized- and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 07 92 00 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.

- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction, so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.
 - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION 08 91 19

SECTION 09 22 16 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Non-load-bearing steel framing systems for interior partitions.
- 2. Suspension systems for interior ceilings and soffits.

B. Related Requirements:

- 1. Section 05 40 00 "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; and roof rafters and ceiling joists.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Including Limiting Heights Table for each application.
- 2. For partitions requiring seismic bracing, submit coordinated set of partition anchorage drawings prior to installation including:
 - a. Description, layout, and location of items to be anchored or braced with anchorage or brace points noted and dimensioned.
 - b. Details of anchorage or bracing at large scale with all members, parts brackets shown, together with all connections, bolts, and welds clearly identified.
 - c. Numerical value of design seismic brace loads.
- 3. For head-of-wall fire-resistive joint systems incorporating proprietary firestop track with intumescent strips, include design designation and documentation, including illustrations, from a qualified testing and inspecting agency acceptable to authorities having jurisdiction that evidences compliance with requirements for each condition indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of code-compliance certification for studs and tracks.

- B. Evaluation Reports: For embossed, high-strength steel studs and tracks, firestop tracks post-installed anchors and power-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.
- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.
- C. Horizontal Deflection: For composite wall assemblies, limited to 1/240 of the wall height based on horizontal loading of 5 lbf/sq. ft..

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C645 requirements for steel unless otherwise indicated.
 - 2. Protective Coating: ASTM A653/A653M, G40, hot-dip galvanized unless otherwise indicated.
- B. Studs and Tracks: ASTM C645. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks.
 - 1. Steel Studs and Tracks:
 - a. Minimum Base-Steel Thickness: As required by performance requirements for horizontal deflection.
 - b. Depth: As indicated on Drawings.
 - c. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1) Formetal Company, Inc.
 - 2) Phillips Manufacturing Co.
 - 3) Steel Network, Inc. (The)
 - 4) Telling Industries
 - 2. Embossed, High Strength Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally comparable to conventional ASTM C645 steel studs and tracks.

-
- a. Minimum Base-Steel Thickness: As required by horizontal deflection performance requirements.
 - b. Depth: As indicated on Drawings.
- C. Slip-Type Head Joints: Where indicated, provide one of the following:
1. Single Long-Leg Track System: ASTM C645 top track with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous bridging located within 12 inches of the top of studs to provide lateral bracing.
 2. Double-Track System: ASTM C645 top outer tracks, inside track with 2-inch- deep flanges in thickness not less than indicated for studs and fastened to studs, and outer track sized to friction-fit over inner track.
 3. Deflection Track: Steel sheet top track manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
1. Minimum Base-Steel Thickness: 0.0329 inch.
- E. Cold-Rolled Channel Bridging: Steel, 0.0538-inch minimum base-steel thickness, with minimum 1/2-inch-wide flanges.
1. Depth: 1-1/2 inches.
 2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch-thick, galvanized steel.
- F. Hat-Shaped, Rigid Furring Channels: ASTM C645.
1. Minimum Base-Steel Thickness: 0.0329 inch.
 2. Depth: 7/8 inch.
- G. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.
1. Configuration: hat shaped.
- H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch-wide flanges.
1. Depth: 3/4 inch.
 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch
 3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch-diameter wire, or double strand of 0.048-inch-diameter wire.
- I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 7/8 inch, minimum uncoated-steel thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Single-Layer Application: 16 inches o.c. unless otherwise indicated.
 - 2. Multilayer Application: 16 inches o.c. unless otherwise indicated.
 - 3. Tile Backing Panels: 16 inches o.c. unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
 - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
 - a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
 - 5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
- E. Direct Furring:
 - 1. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
- F. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 07 21 00 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.
 2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
 3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Hangers: 48 inches o.c.
 2. Carrying Channels (Main Runners): 48 inches o.c.
 3. Furring Channels (Furring Members): 16 inches o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
 - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not attach hangers to steel roof deck.

6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.
- E. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- F. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- G. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 22 16

SECTION 09 29 00 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.

B. Related Requirements:

1. Section 09 22 16 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board panels.

1.3 ACTION SUBMITTALS

A. Product Data: For the following:

1. Gypsum wallboard.
2. Gypsum board, Type X.
3. Flexible gypsum board.
4. Gypsum ceiling board.
5. Mold-resistant gypsum board.
6. Gypsum board, Type C.
7. Cementitious backer units.
8. Sound-attenuation blankets.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

- B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. CertainTeed Corp.
 - 2. Georgia-Pacific Gypsum LLC
 - 3. National Gypsum Company
 - 4. USG Corporation
- B. Gypsum Wallboard: ASTM C1396/C1396M.
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
- C. Gypsum Board, Type X: ASTM C1396/C1396M.
 - 1. Thickness: 5/8 inch.
 - 2. Long Edges: Tapered and featured (rounded or beveled) for prefilling.
- D. Flexible Gypsum Board: ASTM C1396/C1396M. Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
 - 1. Thickness: 1/4 inch.

2. Long Edges: Tapered.

E. Gypsum Ceiling Board: ASTM C1396/C1396M.

1. Thickness: 5/8 inch.
2. Long Edges: Tapered.

F. Mold-Resistant Gypsum Board: ASTM C1396/C1396M. With moisture- and mold-resistant core and paper surfaces.

1. Core: 5/8 inch, Type X.
2. Long Edges: Tapered.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.4 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 and ASTM C1288 or ASTM C1325, with manufacturer's standard edges.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. C-Cure; C-Cure Board 990
 - b. CertainTeed Corp, FiberCement
 - c. Custom Building Products; WonderBoard Lite Backerboard
 - d. National Gypsum Company; Permabase Cement Board
 - e. USG Corporation; DUROCK Cement Board
2. Thickness: 5/8 inch.
3. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C1047.

1. Material: Galvanized or aluminum-coated steel sheet or rolled zinc.
2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.
 - d. L-Bead: L-shaped; exposed long flange receives joint compound.
 - e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
 - f. Expansion (control) joint.
 - g. Curved-Edge Cornerbead: With notched or flexible flanges.

B. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.

1. Products: Exposed accessories as indicated on Drawings by Fry Reglet or comparable manufacturer subject to compliance with requirements.
2. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221, Alloy 6063-T5.
3. Finish: Anodized: Architectural 204R1 medium etch 0.40 mils minimum (AA-M12C22A31), clear color.

2.6 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C475/C475M.
- B. Joint Tape:
 1. Interior Gypsum Board: Paper.
 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.
 1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 5. Skim Coat: For final coat of Level 5 finish, use drying-type, all-purpose compound.
- D. Joint Compound for Tile Backing Panels:
 1. Cementitious Backer Units: As recommended by backer unit manufacturer.

2.7 AUXILIARY MATERIALS

- A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C1002 unless otherwise indicated.
 1. Use screws complying with ASTM C954 for fastening panels to steel members from 0.033 to 0.112 inchthick.
 2. For fastening cementitious backer units, use screws of type and size recommended by panel manufacturer.

- D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- E. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90
- 1.
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Accumetric LLC; BOSS 824 Acoustical Sound Sealant.
 - b. Grabber Construction Products; Acoustical Sealant GSC.
 - c. Pecora Corporation; AC20 FTR.
 - d. Specified Technologies, Inc.; Smoke N Sound Acoustical Sealant.
 - e. USG Corporation; SHEETROCK Acoustical Sealant
- F. Thermal Insulation: As specified in Section 07 21 00 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION AND FINISHING OF PANELS, GENERAL

- A. Comply with ASTM C840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft.in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch-wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide 1/4- to 1/2-inch-wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- J. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Wallboard Type: As indicated on Drawings.
 - 2. Type X: Where required for fire-resistance-rated assembly.
 - 3. Flexible Type: Apply in double layer at curved assemblies.
 - 4. Ceiling Type: As indicated on Drawings.
 - 5. Mold-Resistant Type: As indicated on Drawings.
- B. Single-Layer Application:
 - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated.

2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
 - b. At stairwells and other high walls, install panels horizontally unless otherwise indicated or required by fire-resistance-rated assembly.
3. On Z-shaped furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

D. Curved Surfaces:

1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch-long straight sections at ends of curves and tangent to them.
2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 INSTALLATION OF TILE BACKING PANELS

- A. Cementitious Backer Units: ANSI A108.11, at showers, tubs, and where indicated.

3.5 INSTALLATION OF TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

- B. Control Joints: Install control joints according to ASTM C840 and in specific locations approved by Design Professional for visual effect.
- C. Interior Trim: Install in the following locations:
 - 1. Cornerbead: Use at outside corners unless otherwise indicated.
 - 2. LC-Bead: Use at exposed panel edges.
 - 3. L-Bead: Use where indicated and where panel meets adjacent surfaces.
 - 4. U-Bead: Use at exposed panel edges.
 - 5. Curved-Edge Cornerbead: Use at curved openings.
- D. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, rounded or beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C840:
 - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 - 2. Level 2: Panels that are substrate for tile.
 - 3. Level 3: Not used.
 - 4. Level 4: At panel surfaces that will be exposed to view, at areas that are not occupied secondary spaces, and at closets, storage rooms, etc..
 - a. Level 4 finish is achieved by using the Gypsum Construction Handbook and the following requirements:
 - 1) 1st coat embedded
 - 2) 2nd coat fill
 - 3) 3rd coat level coat
 - 4) 4th coat finish coat
 - b. Sanding is required between 3rd and 4th coats and after 4th coat.
 - c. Each coat shall be a separate operation. Coats may not be combined.
 - d. A minimum of three coats are required over fasteners.
 - 5. Level 5: At all areas exposed to view.
 - a. Level 5 finish is achieved by using the Gypsum Construction Handbook and the following requirements:

- 1) 1st coat embedded
 - 2) 2nd coat fill
 - 3) 3rd coat level coat
 - 4) 4th coat finish coat
 - 5) 5th coat skim
- b. Sanding is required between 4th and 5th coats.
 - c. A minimum of four coats are required over fasteners.
 - d. Skim coat is the operation of applying joint treatment compound to cover the entire surface of gypsum wall board including joints so as not paper is visible. This operation is trowel applied. Roller or spray type products will not be accepted as "skim coat". Finish and sand with 220 or wet sand. Tough-up as needed where gypsum board paper shows.
- E. Cementitious Backer Units: Finish according to manufacturer's written instructions.

3.7 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

SECTION 09 30 13 - TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Ceramic tile.
2. Quarry tile.
3. Porcelain tile.
4. Stone thresholds.
5. Crack isolation membrane.
6. Metal edge strips.

B. Related Requirements:

1. Section 07 92 00 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Section 09 29 00 "Gypsum Board" for cementitious backer units.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."
- C. Face Size: Actual tile size, excluding spacer lugs.
- D. Module Size: Actual tile size plus joint width indicated.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- C. Samples for Initial Selection: For tile, grout, and accessories involving color selection.
- D. Samples for Verification:
 1. Full-size units of each type and composition of tile and for each color and finish required. For ceramic mosaic tile in color blend patterns, provide full sheets of each color blend.
 2. Stone thresholds in 6-inch lengths.
 3. Metal edge strips in 6-inch lengths.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of product.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.

- D. Store liquid materials in unopened containers and protected from freezing.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.2 TILE PRODUCTS

- A. Glazed Ceramic Tile, Wall (CTW): Ceramic tile as indicated on the Room Finish Legend.
 - 1. Basis-of-design: Daltile Color Wheel Collection - Linear
- B. Quarry Tile (QTF): Quarry tile as indicated on the Room Finish Legend.
 - 1. Basis-of-design: Daltile Quarry Tile
- C. Quarry Tile, Base (QTB): Quarry cove base tile as indicated on the Room Finish Legend.
 - 1. Basis-of-design: Daltile Quarry Tile Cove Base

2.3 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch or less above adjacent floor surface.

B. Granite Thresholds: ASTM C615/C615M, with polished finish.

1. Description: Uniform, fine -grained, gray stone without veining.

2.4 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Custom Building Products
- b. Laticrete International, Inc.
- c. MAPEI Corporation

C. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

- a. Bonsal American, an Oldcastle company
- b. C-Cure
- c. Custom Building Products
- d. Laticrete International, Inc.
- e. MAPEI Corporation

2.5 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product that complies with ANSI A118.12 for standard performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.

B. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.

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

- a. Boiardi Products; a QEP company; Elastiment 344 Reinforced Waterproofing and Anti-Fracture/Crack Suppression Membrane.

- b. Bonsal American; an Oldcastle company; B 6000 Waterproof Membrane with
- c. Glass Fabric.
- d. Bostik, Inc.; Hydroment Blacktop 90210.
- e. Custom Building Products; 9240 Waterproofing and Anti-Fracture Membrane.
- f. Laticrete International, Inc.; Laticrete Blue 92 Anti-Fracture Membrane.
- g. MAPEI Corporation; Mapelastc HPG with MAPEI Fiberglass Mesh.
- h. Mer-Kote Products, Inc.; Hydro-Guard 2000

2.6 SETTING MATERIALS

- A. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.
 1. Cleavage Membrane: Asphalt felt, ASTM D226/D226M, Type I (No. 15); or polyethylene sheeting, ASTM D4397, 4.0 mils thick.
 2. Latex Additive: Manufacturer's standard water emulsion, serving as replacement for part or all of gaging water, of type specifically recommended by latex-additive manufacturer for use with field-mixed portland cement and aggregate mortar bed.
- B. Modified Dry-Set Mortar (Thinset): ANSI A118.4.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bonsal American; an Oldcastle company.
 - b. Custom Building Products.
 - c. Laticrete International, Inc.
 - d. MAPEI Corporation.
 - e. TEC; a subsidiary of H. B. Fuller Company
 2. Provide prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site.
 3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

2.7 GROUT MATERIALS

- A. Sand-Portland Cement Grout: ANSI A108.10, consisting of white or gray cement and white or colored aggregate as required to produce color indicated.
- B. High-Performance Tile Grout: ANSI A118.7.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Bonsal American; an Oldcastle company
 - b. Bostik, Inc.
 - c. Custom Building Products.
 - d. Laticrete International, Inc.

- e. MAPEI Corporation.
 - f. TEC; a subsidiary of H. B. Fuller Company.
2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.
- C. Water-Cleanable Epoxy Grout: ANSI A118.3.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- a. Bostik, Inc.
 - b. Custom Building Products
 - c. Five Star Products
 - d. Laticrete International
2. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F, respectively, and certified by manufacturer for intended use.

2.8 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; stainless steel, ASTM A276/A276M or ASTM A666, 300 Series exposed-edge material.
- C. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- D. Floor Sealer: Manufacturer's standard product for sealing grout joints and that does not change color or appearance of grout.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
- a. Bonsal American; an Oldcastle company; Grout Sealer
 - b. Bostik, Inc.
 - c. Custom Building Products; Surfaceguard Sealer
 - d. TEC; a subsidiary of H. B. Fuller Company; TA-256 Penetrating Silicone Grout Sealer

2.9 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
 - 1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with bonded mortar bed or thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
 - 4. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Design Professional.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproof membrane by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

- C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 INSTALLATION OF CERAMIC TILE

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
1. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- F. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Ceramic Tile: 1/4 inch.
 2. Quarry Tile: 1/4 inch.
- G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

- H. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.
 - 1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in modified dry-set mortar (thinset).
 - 2. Do not extend crack isolation membrane under thresholds set in modified dry-set mortar. Fill joints between such thresholds and adjoining tile set on crack isolation membrane with elastomeric sealant.
- I. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.
- J. Floor Sealer: Apply floor sealer to cementitious grout joints in tile floors according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 INSTALLATION OF CRACK ISOLATION MEMBRANE

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.
- B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.5 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

3.6 PROTECTION

- A. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

END OF SECTION 09 30 13

SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for interior ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For components with factory-applied finishes.
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Acoustical Panels: Set of 6-inch- square Samples of each type, color, pattern, and texture.

1.4 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
 - 1. Ceiling suspension-system members.
 - 2. Method of attaching hangers to building structure.
 - 3. Items penetrating finished ceiling and ceiling-mounted items including the following:
 - a. Lighting fixtures.
 - b. Diffusers.
 - c. Grilles.
 - d. Access panels.
 - e. Perimeter moldings.
 - 4. Minimum Drawing Scale: 1/4 inch = 1 foot.
- B. Qualification Data: For testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Units: Full-size panels equal to 2 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and a stabilized moisture content.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: Class A according to ASTM E1264.
2. Smoke-Developed Index: 50 or less.

2.3 ACOUSTICAL PANELS

A. Manufacturers: Subject to compliance with requirements, provide products listed on the Room Finish Schedule, or comparable products by one of the following:

1. Armstrong World Industries, Inc. (Basis of design)
2. National Gypsum Company
3. Rockfon North America
4. USG Corporation

B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.

C. Classification: Provide panels as follows:

1. APC-1 Type and Form: Type III, mineral base with painted finish; Form 2, water felted.
 - a. Light Reflectance (LR): Not less than 82%
 - b. Ceiling Attenuation Class (CAC): Not less than 33
 - c. Noise Reduction Coefficient (NRC): Not less than 0.55
 - d. Articulation Class (AC): N/A
 - e. Edge/Joint Detail: Square
 - f. Thickness: 5/8 inch
 - g. Pattern: C
2. APC-2 Type and Form: Type IV, mineral base with painted finish; Form 2, water felted.
 - a. Light Reflectance (LR): Not less than 86%
 - b. Ceiling Attenuation Class (CAC): Not less than 38
 - c. Noise Reduction Coefficient (NRC): Not less than 0.70
 - d. Articulation Class (AC): N/A
 - e. Edge/Joint Detail: Square
 - f. Thickness: 3/4 inch
 - g. Pattern: E
3. APC-3 Type and Form: Type XII, glass-fiber base with membrane-faced overlay; Form 2, cloth. Binder shall not contain urea formaldehyde.
 - a. Light Reflectance (LR): Not less than 88%
 - b. Ceiling Attenuation Class (CAC): N/A
 - c. Noise Reduction Coefficient (NRC): Not less than 0.90
 - d. Articulation Class (AC): N/A
 - e. Edge/Joint Detail: Square
 - f. Thickness: 3/4 inch
 - g. Pattern: E

4. APC-4 Type and Form: Type XX, mineral base with membrane-faced overlay; Form 2, perforated, wet-formed ceramic and mineral fiber composite.
 - a. Light Reflectance (LR): Not less than 79%
 - b. Ceiling Attenuation Class (CAC): 38
 - c. Noise Reduction Coefficient (NRC): Not less than 0.55
 - d. Articulation Class (AC): N/A
 - e. Edge/Joint Detail: Square
 - f. Thickness: 5/8 inch
 - g. Pattern: CE

D. Color: As indicated on Drawings.

E. Modular Size: 24 by 24 inches.

F. Antimicrobial Treatment: Manufacturer's standard broad spectrum, antimicrobial formulation that inhibits fungus, mold, mildew, and gram-positive and gram-negative bacteria and showing no mold, mildew, or bacterial growth when tested according to ASTM D3273, ASTM D3274, or ASTM G21 and evaluated according to ASTM D3274 or ASTM G21.

G. Humidity Resistant Treatment: Provide manufacturer's standard product that provides a 30-year guarantee against visible sag.

2.4 METAL SUSPENSION SYSTEM

A. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C635/C635M and designated by type, structural classification, and finish indicated.

1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C635/C635M.

B. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized, G30 coating designation; with prefinished 15/16-inch- wide metal caps on flanges.

1. Structural Classification: Heavy-duty system.
2. End Condition of Cross Runners: Override (stepped) type.
3. Face Design: Flat, flush.
4. Cap Material: aluminum.
5. Cap Finish: Painted in color as selected from manufacturer's full range.

2.5 ACCESSORIES

A. Seismic Clips: Manufacturer's standard seismic clips designed to secure acoustical panels in place during a seismic event.

- B. Seismic Stabilizer Bars: Manufacturer's standard perimeter stabilizers designed to accommodate seismic forces.

2.6 ACOUSTICAL SEALANT

- A. Acoustical Sealant: As specified in Section 07 92 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C636/C636M, seismic design requirements, and manufacturer's written instructions.
- B. Suspend ceiling hangers from building's structural members and as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 3. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly to structure or to inserts, eye

- screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
4. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
 5. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, post installed mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 6. Do not attach hangers to steel deck tabs.
 7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 8. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 9. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
- C. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- D. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
1. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.
 2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
 3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
 4. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.

3.5 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.

- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

SECTION 09 65 13 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Thermoplastic-rubber base.
 - 2. Rubber stair accessories.
 - 3. Rubber molding accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of product indicated.
- C. Samples for Verification: For each type of product indicated and for each color, texture, and pattern required in manufacturer's standard-size Samples, but not less than 12 inches long.
- D. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F For more than 90 deg F.

1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive resilient products during the following periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 85 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 THERMOPLASTIC-RUBBER BASE (RBS-1)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Allstate Flooring
 - 2. Mannington Commercial
 - 3. Nora Systems, Inc.
 - 4. The R.C. Musson Rubber Co.
 - 5. Roppe Corporation
 - 6. Armstrong Flooring Commercial
 - 7. Tarkett
- B. Product Standard: ASTM F1861, Type TV (vinyl, thermoplastic).
 - 1. Group: I (solid, homogeneous).
 - 2. Style and Location:
 - a. Style B, Cove: Provide in areas indicated on Drawings.
- C. Minimum Thickness: 0.125 inch.
- D. Height: 4 inches.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Preformed.
- G. Inside Corners: Job formed or preformed.

- H. Colors and Patterns: As indicated on the Room Finish Legend.

2.2 RUBBER STAIR ACCESSORIES (RST-1)

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Allstate Flooring
 2. Armstrong Flooring
 3. Mannington Commercial
 4. Roppe Corporation
 5. Tarkett USA
- C. Stair Treads: ASTM F2169.
1. Type: TS (rubber, vulcanized thermoset) or TP (rubber, thermoplastic).
 2. Class: 2 (pattern; embossed, grooved, or ribbed).
 3. Group: 2 (with contrasting color for the visually impaired).
 4. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.
 5. Nosing Height: 1-1/2 inches.
 6. Thickness: 1/4 inch and tapered to back edge.
 7. Size: Lengths and depths to fit each stair tread in one piece.
- D. Landing Tile: Matching treads; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.
- E. Locations: Provide rubber stair accessories in areas indicated on the Drawings.
- F. Colors and Patterns: As selected by Design Professional from full range of industry colors.

2.3 RUBBER MOLDING ACCESSORY

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Mannington Commercial
 2. Roppe Corporation
 3. SRP Industries
 4. Tarkett USA
- B. Description: Cap for cove resilient floor covering, carpet edge for glue-down applications, nosing for carpet, nosing for resilient floor covering, reducer strip for resilient floor covering, joiner for tile and carpet and transition strips.

- C. Profile and Dimensions: As selected by Design Professional from full range.
- D. Colors and Patterns: As selected by Design Professional from full range of industry colors..

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by resilient-product manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by resilient-product manufacturer for resilient products and substrate conditions indicated.
- C. Metal Edge Strips: Extruded aluminum with mill finish, nominal 2 inches wide, of height required to protect exposed edges of flooring, and in maximum available lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
 - 1. Installation of resilient products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates for Resilient Stair Accessories: Prepare horizontal surfaces according to ASTM F710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.

3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install resilient products until materials are the same temperature as space where they are to be installed.
 1. At least 48 hours in advance of installation, move resilient products and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient products.

3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practical without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Preformed Corners: Install preformed corners before installing straight pieces.
- H. Job-Formed Corners:
 1. Inside Corners: Use straight pieces of maximum lengths possible and form with returns not less than 3 inches in length.

3.4 RESILIENT ACCESSORY INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient accessories.
- B. Resilient Stair Accessories:
 - 1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
 - 2. Tightly adhere to substrates throughout length of each piece.
 - 3. For treads installed as separate, equal-length units, install to produce a flush joint between units.
- C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting resilient products.
- B. Perform the following operations immediately after completing resilient-product installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum horizontal surfaces thoroughly.
 - 3. Damp-mop horizontal surfaces to remove marks and soil.
- C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover resilient products subject to wear and foot traffic until Material Completion.

END OF SECTION 09 65 13

SECTION 09 65 19 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Luxury vinyl floor tile.
 - 2. Luxury vinyl floor plank.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of resilient floor tile.
 - 1. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
 - 2. Show details of special patterns.
- C. Samples: Full-size units of each color, texture, and pattern of floor tile required.
- D. Product Schedule: For floor tile. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F. Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following periods:
 1. 48 hours before installation.
 2. During installation.
 3. 48 hours after installation.
- B. After installation and until Material Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

1.10 WARRANTY

- A. Products shall be backed by a limited 20-year commercial warranty.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

2.2 LUXURY VINYL FLOOR TILE LVT-1, LVT-3

- A. Manufacturers: Provide products as indicated on Finish Schedule or by one of the following, subject to compliance with requirements:
 1. Armstrong Flooring
 2. Mannington Commercial
 3. Milliken
 4. Shaw Floors
 5. Tarkett
- B. Tile Standard: ASTM F1700.
 1. Class: Class III, Printed Film Vinyl Tile.
- C. Thickness: 0.125 inch.
- D. Size: As indicated on Room Finish Legend.

2.3 LUXURY VINYL FLOOR PLANK (LVT-2)

- A. Manufacturers: Provide products as indicated on Finish Schedule or by one of the following, subject to compliance with requirements:
 1. Armstrong Flooring
 2. Mannington Commercial
 3. Milliken
 4. Shaw Floors
 5. Tarkett
- B. Tile Standard: ASTM F1700.
 1. Class: Class III, Printed Film Vinyl Tile.
- C. Thickness: 0.125 inch
- D. Size: As indicated on Room Finish Legend.

2.4 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
 - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
 - 4. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
 - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.

- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Cover floor tile until Material Completion.

END OF SECTION 09 65 19

SECTION 09 67 23 - RESINOUS FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Resinous flooring.
 - 2. Integral cove base accessories.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review manufacturer's written instructions for substrate preparation and environmental conditions affecting resinous flooring installation.
 - 2. Review details of integral cove bases.
 - 3. Review manufacturer's written instructions for installing resinous flooring systems.
 - 4. Review protection measures for adjacent construction and installed flooring, floor drainage requirements, curbs, base details, and so forth.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's technical data, installation instructions, and recommendations for each resinous flooring component required.
- B. Samples for Verification: For each resinous flooring system required and for each color and texture specified, 6 inches square, applied to a rigid backing by Installer for this Project.
- C. Shop Drawings:
 - 1. Provide floor plans to scale matching Architectural Plans, indicating extent of each resinous floor/wall system, including type, color and pattern, degree of slip-resistance, and dimensioned locations of control joints, seams, divider strips, and terminations.
 - 2. Provide enlarged details indication terminations at walls, door frames, pits, curbing, etc.

- D. Substitution Requests: All substitution requests must be received for review 10 days prior to bid date and must be included in Contractor's bid proposal. Failure to do so will result in disqualification to perform the work in this section

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Material Certificates: For each resinous flooring component.
- C. Material Test Reports: For each resinous flooring system, by a qualified testing agency.
- D. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For resinous flooring to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.
 - 1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 - 1. Apply full-thickness mockups on 96-inch- square floor area selected by Architect.
 - a. Include 96-inch length of integral cove base with inside and outside corner.
 - 2. Simulate finished lighting conditions for Architect's review of mockups.
 - 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Design Professional specifically approves such deviations in writing.
 - 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating brand name and directions for storage and mixing with other components.

1.9 FIELD CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring installation.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring installation.
- C. Close spaces to traffic during resinous flooring installation and for 24 hours after installation unless manufacturer recommends a longer period.

1.10 WARRANTY

- A. Manufacturer shall furnish a single, written warranty covering 100% of the material and labor costs protecting the Owner from delamination, disbondment, and osmotic/hydrostatic failure for a period of one year from date of installation.
 - 1. Issuance of warranty shall be a condition precedent to receipt of final payment by the Installer.
 - 2. Extent of warranty shall be limited to the repair or replacement of defective surfaces at no cost to the Owner, and for any damage directly resulting from such defects during the warranty period. The warranty shall not include any remedy for defects caused by abuse, improper maintenance or operation, or by normal wear, tear and usage.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Flammability: Self-extinguishing in accordance with ASTM D635.

2.2 RESINOUS FLOORING

- A. Resinous Flooring System: Abrasion-, impact-, and chemical-resistant, aggregate-filled, resin-based monolithic floor surfacing designed to produce a seamless floor and integral cove base.
 - 1. Manufactureres: Subject to compliance with requirements, provide products by one of the following:
 - a. Key Resin Company (Basis-of-design: Key Urecon TG and Key Chip 100-Buckley where indicated as decorative) as installed by:
 - b. BASF
 - c. Stonhard, Inc.
 - d. Prime Coat Coating Systems
 - e. Plexi-Chemie, Inc.
 - f. Florock

- B. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, from single source from single manufacturer. Obtain secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from manufacturer recommended in writing by manufacturer of primary materials.
- C. Pre-approval is required for both the chemical manufacture and the installer by Design Professional for any and all substitutions. Only products which are equal to the Basis of Design in installed thickness, chemistry, and componentry shall be considered.
- D. System Characteristics:
1. Color and Pattern: As selected by Design Professional from manufacturer's full range.
 2. Wearing Surface: Textured for slip resistance.
 3. Overall System Thickness: 1/8 inch.
- E. System Physical Properties: Provide resinous flooring system with the following minimum physical property requirements when tested in accordance with test methods indicated:
1. Compressive Strength: 7,500 psi minimum in accordance with ASTM C579.
 2. Tensile Strength: 800 psi minimum in accordance with ASTM C307.
 3. Flexural Modulus of Elasticity: 1.7×10^5 psi minimum in accordance with ASTM C580.
 4. Impact Resistance: No chipping, cracking, or delamination and not more than 1/16-inch permanent indentation in accordance with MIL-D-3134J.
 5. Resistance to Elevated Temperature: No slip or flow of more than 1/16 inch in accordance with MIL-D-3134J.
- F. System Chemical Resistance: Test specimens of cured resinous flooring system are unaffected when tested in accordance with ASTM D1308 for 50 percent immersion in the following reagents for no fewer than seven days:
1. Resinous flooring shall withstand chemical attack by agents provided in writing by Owner, in temperatures and concentrations stated therein..
 2. Resinous flooring shall withstand vehicular traffic in accordance with wheel sizes, types, and loads provided in writing by Owner.
- G. Primer: Type recommended in writing by resinous flooring manufacturer for substrate and resinous flooring system indicated.
1. Formulation Description: 100 percent solids.
- H. Waterproofing Membrane: Type recommended in writing by resinous flooring manufacturer for substrate and resinous flooring system indicated.
1. Formulation Description: 100 percent solids.
- I. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended in writing by manufacturer for installation indicated.
- J. Body Coats:

1. Resin: Epoxy.
2. Formulation Description: 100 percent solids.
3. Type: Clear.
4. Installation Method: Troweled or screeded.
5. Number of Coats: One.
6. Thickness of Coats: 10 mils.
7. Aggregates: Manufacturer's standard.

K. Grout Coat:

1. Resin: Epoxy.
2. Type: Clear.

L. Topcoats: Sealing or finish coats.

1. Resin: Polyaspartic.
2. Formulation Description: 100 percent solids.
3. Type: Clear.
4. Number of Coats: One.
5. Thickness of Coats: 12 mils.
6. Finish: Matte.

2.3 INTEGRAL COVE BASE ACCESSORIES

A. Precast, Integral Cove Base: Impact-resistant, polymer-resin, cove base moldings with a grit profile to promote adhesion of resinous flooring and recommended in writing by resinous flooring manufacturer.

1. Radius Cove: Cove molding with approximately 1-inch radius for adhesive installation at floor-to-wall joint as substrate to receive resinous flooring system to form an integral cove base.
2. Radius Cove Base: 6-inch- high base molding that provides approximately 1-inch radius cove at floor-to-wall joint; for adhesive installation as substrate for resinous flooring system to form an integral cove base.
 - a. Preformed Inside and Outside Corners: Provide manufacturer's standard square inside and 3/4- to 1-inch bullnose outside corners.

B. Installation Adhesive: As recommended in writing by accessory manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resinous flooring systems.

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

3.2 PREPARATION

A. Prepare and clean substrates in accordance with resinous flooring manufacturer's written instructions for substrate indicated to ensure adhesion.

B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.

1. Roughen concrete substrates as follows:

- a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
- b. Comply with requirements in SSPC-SP 13/NACE No. 6, with a Concrete Surface Profile of 3 or greater in accordance with ICRI Technical Guideline No. 310.2R, unless manufacturer's written instructions are more stringent.

2. Repair damaged and deteriorated concrete in accordance with resinous flooring manufacturer's written instructions.

3. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. , and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

- a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
- b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

4. Alkalinity and Adhesion Testing: Perform tests recommended in writing by resinous flooring manufacturer. Proceed with installation only after substrate alkalinity is not less than 6 or more than 8 pH unless otherwise recommended in writing by flooring manufacturer,

C. Patching and Filling: Use patching and fill material to fill holes and depressions in substrates in accordance with manufacturer's written instructions.

1. Control Joint Treatment: Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring in accordance with manufacturer's written instructions.

- D. Resinous Materials: Mix components and prepare materials in accordance with resinous flooring manufacturer's written instructions.

3.3 INSTALLATION

- A. Apply components of resinous flooring system in accordance with manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness specified.
 - 1. Coordinate installation of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
 - 2. Cure resinous flooring components in accordance with manufacturer's written instructions. Prevent contamination during installation and curing processes.
 - 3. Expansion and Isolation Joint Treatment: At substrate expansion and isolation joints, comply with resinous flooring manufacturer's written instructions.
- B. Primer: Apply primer over prepared substrate at spreading rate recommended in writing by manufacturer.
- C. Waterproofing Membrane: Apply waterproofing membrane over entire substrate surface, in thickness recommended in writing by manufacturer.
 - 1. Apply waterproofing membrane to integral cove base substrates.
- D. Integral Cove Base Accessories: Adhesively install precast accessories before applying flooring coats and in accordance with manufacturer's written instructions.
- E. Troweled or Screeded Body Coats: Apply troweled or screeded body coats in thickness specified for flooring system. Hand or power trowel and grout to fill voids. When body coats are cured, remove trowel marks and roughness using method recommended in writing by manufacturer.
- F. Grout Coat: Apply grout coat to fill voids in surface of final body coat.
- G. Topcoats: Apply topcoats in number indicated for flooring system specified, at spreading rates recommended in writing by manufacturer, and to produce wearing surface specified.

3.4 FIELD QUALITY CONTROL

- A. Core Sampling: At Owner's direction and at locations designated by Owner, take one core sample per 1000 sq. ft. of resinous flooring, or portion of, to verify thickness. For each sample that fails to comply with requirements, take two additional samples. Repair damage caused by coring. Correct deficiencies in installed flooring as indicated by testing.

3.5 PROTECTION

- A. Protect resinous flooring from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by resinous flooring manufacturer.

END OF SECTION 09 67 23

SECTION 09 68 13 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Modular carpet tile.

- B. Related Requirements:

- 1. Section 09 65 13 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

- 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
 - a. Review delivery, storage, and handling procedures.
 - b. Review ambient conditions and ventilation procedures.
 - c. Review subfloor preparation procedures.
 - d. Review carpet install orientations and patterns.

1.4 ACTION SUBMITTALS

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

- 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
 - 2. Include manufacturer's written installation recommendations for each type of substrate.

- B. Shop Drawings: For carpet tile installation, plans showing the following:

- 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
 - 2. Carpet tile type, color, and dye lot.

3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

C. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- long Samples.

D. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.
- C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:
 1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
 2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Carpet Tile: Full-size units equal to 5 boxes of amount installed for each type indicated.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Master II certification level.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the Carpet and Rug Institute's CRI 104.

1.10 FIELD CONDITIONS

- A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
 - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
 - 2. Failures include, but are not limited to, the following:
 - a. More than 10 percent edge raveling, snags, and runs.
 - b. Dimensional instability.
 - c. Excess static discharge.
 - d. Loss of tuft-bind strength.
 - e. Loss of face fiber.
 - f. Delamination.
 - 3. Warranty Period: 5 years from date of Material Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE(CPT-1 thru CPT-15)

- A. See Finish Legend, Schedule and Plans for specified carpet tile and locations.

- B. Manufacturers: Subject to compliance with requirements, provide products by one or more of the following:
1. Shaw Contract
 2. Milliken
 3. Interface

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.
- B. Examine carpet tile for type, color, pattern, and potential defects.
- C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 03 30 00 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 5 lb of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 - c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch wide or wider, and protrusions more than 1/32 inch unless more stringent requirements are required by manufacturer's written instructions.
- C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye-lot integrity. Do not mix dye lots in same area.
- D. Maintain pile-direction patterns indicated on Drawings.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
 2. Remove yarns that protrude from carpet tile surface.
 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect installed carpet tile to comply with the Carpet and Rug Institute's CRI 104, Section 13.7.
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09 68 13

SECTION 097723 - FABRIC-WRAPPED PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes shop-fabricated, fabric-wrapped wall panels.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include fabric facing, panel edge, core material, and mounting indicated.
- B. Shop Drawings: For panel assembly and installation.
 - 1. Include plans, elevations, sections, and mounting devices and details.
 - 2. Include details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge profile and core materials.
 - 3. Include details at cutouts and penetrations for other work.
 - 4. Include direction of fabric weave and pattern matching.
- C. Samples for Initial Selection: For each type of fabric facing.
 - 1. Include Samples of hardware and accessories involving color or finish selection.
- D. Samples for Verification: For the following products:
 - 1. Fabric: Full-width by approximately 36-inch- long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
 - 2. Panel Edge: 12-inch- long Sample(s) showing each edge profile, corner, and finish.
 - 3. Core Material: 12-inch- square Sample at corner.
 - 4. Mounting Devices: Full-size Samples.
 - 5. Assembled Panels: Approximately 36 by 36 inches, including joints and mounting methods.

1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Elevations and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
1. Electrical outlets, switches, and thermostats.
 2. Items penetrating or covered by panels including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Alarms.
 - e. Sprinklers.
 - f. Access panels.
 3. Show operation of hinged and sliding components covered by or adjacent to panels.
- B. Product Certificates: For each type of panel.
- C. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of panel to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal instructions.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Fabric: For each fabric, color, and pattern installed, provide length equal to 10 percent of amount installed, but no fewer than 10 sq. yd., full width of bolt.
 2. Mounting Devices: Full-size units equal to 5 percent of amount installed, but no fewer than five devices, including unopened adhesives.

1.8 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials, fabrication, and installation.
1. Build mockup of typical wall area as shown on Drawings.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and panel manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and panels in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.10 FIELD CONDITIONS

- A. Environmental Limitations: Do not install panels until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Lighting: Do not install panels until a permanent level of lighting is provided on surfaces to receive the panels.
- C. Air-Quality Limitations: Protect panels from exposure to airborne odors such as tobacco smoke, and install panels under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify panel locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace panels and components that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Fabric sagging, distorting, or releasing from panel edge.
 - b. Warping of core.
 2. Warranty Period: Two years from date of Material Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain fabric-wrapped wall panels from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Panels shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
1. Surface-Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.
 3. Sound Absorption Rating: Class A absorber per ISO 11654 (40mm overall depth of system)
 4. Noise Reduction Coefficient (NRC): 0.95 (A-mounting) per ASTM C423
 5. Sound Absorption Average (SAA): 0.96 (A-mounting) per ASTM C423
 6. Light Reflectance (LR) per ASTM E1477: 0.5 to 0.81 (dependent upon color)
 7. Humidity Resistance per ISO 4611: Install in conditions that do not exceed 70% relative humidity and 77° F

2.3 FABRIC-WRAPPED WALL PANELS

- A. Fabric-Wrapped Wall Panel <: Manufacturer's standard panel construction consisting of facing material stretched over front face of edge-framed core and bonded or attached to edges and back of frame.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Certainteed Ceilings (Basis of design: Ecophon Akusto Wall Panel C Textona for AWP-2, AWP-7, AWP-8)
 - b. Carnegie (Basis of design: Xorel Artform for AWP-3A & 3B, AWP-4A & 4B, AWP-5, AWP-6)
 - c. Armstrong Ceiling & Wall Solutions
 - d. Commercial Acoustics
 - e. G&S Acoustics
 2. Panel Shape: As indicated on Drawings.
 3. Mounting: Edge mounted with splines secured to substrate.
 - a. Finish Color at Exposed Edges: As selected by Design Professional from manufacturer's full range.

4. Mounting: Back mounted with manufacturer's standard metal clips or bar hangers, secured to substrate.
5. Core: High density fiberglass.
6. Edge Profile: Long edges kerfed and rabbeted to receive splines.
7. Corner Detail in Elevation: Custom as indicated on Drawings with continuous edge profile indicated.
8. Reveals between Panels: Recessed reveals as selected by Design Professional from manufacturer's full range.
9. Facing Material: Woven fiberglass fabric.
10. Nominal Overall Panel Thickness: 1-9/16 inches min..
11. Panel Width: As indicated on Drawings.
12. Panel Height: As indicated on Drawings.

2.4 MATERIALS

- A. Mounting Devices: Concealed on back of panel, recommended by manufacturer to support weight of panel, and as follows:
 1. Splines: Manufacturer's standard concealed metal or plastic splines that engage the kerfed edges of the panel, with other moldings and trim for interior corners, exterior corners, and exposed edges, with factory-applied finish on exposed items.

2.5 FABRICATION

- A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Facing Material : Apply fabric fully covering visible surfaces of panel; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
- C. Dimensional Tolerances of Finished Panels: Plus or minus 1/16 inch for the following:
 1. Thickness.
 2. Edge straightness.
 3. Overall length and width.
 4. Squareness from corner to corner.
 5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated panels, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting panel performance.

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

3.2 INSTALLATION

- A. Install panels in locations indicated. Unless otherwise indicated, install panels with vertical surfaces and edges plumb, top edges level and in alignment with other panels, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with manufacturer's written instructions for installation of panels using type of mounting devices indicated. Mount panels securely to supporting substrate.
- C. Align fabric pattern and grain with adjacent panels.

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch in 48 inches, noncumulative.
- B. Variation of Joint Width: Not more than 1/32 inch wide from hairline in 48 inches, noncumulative.

3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 097723

SECTION 09 84 00 - SOUND-ABSORBING WALL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes shop-fabricated, acoustical panel units tested for acoustical performance, including the following:
 - 1. Sound-absorbing wall units.
 - 2. Sound-diffusing wall units.

1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.
- B. SAA: Sound Absorption Average.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include fabric facing, panel edge, core material, and mounting indicated.
- B. Shop Drawings: For unit assembly and installation.
 - 1. Include plans, elevations, sections, and mounting devices and details.
 - 2. Include details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge profile and core materials.
 - 3. Include details at cutouts and penetrations for other work.
 - 4. Include direction of fabric weave and pattern matching.
- C. Samples for Initial Selection: For each type of fabric facing.
 - 1. Include Samples of hardware and accessories involving color or finish selection.
- D. Samples for Verification: For the following products:

1. Fabric: Full-width by approximately 36-inch- long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
2. Panel Edge: 12-inch- long Sample(s) showing each edge profile, corner, and finish.
3. Core Material: 12-inch- square Sample at corner.
4. Mounting Devices: Full-size Samples.
5. Assembled Panels: Approximately 36 by 36 inches, including joints and mounting methods.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of unit.
- B. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of unit to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal instructions.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Lighting: Do not install units until a permanent level of lighting is provided on surfaces to receive the units.
- C. Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace units and components that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to the following:
 - a. Acoustical performance.
 - b. Fabric sagging, distorting, or releasing from panel edge.
 - c. Warping of core.
 2. Warranty Period: Two years from date of Material Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
1. Surface-Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.
 3. Airborne Noise Reduction: Provide acoustical absorber and diffuser panels in layout designed by computer simulation based on Fitzroy formulas to provide the following sound reduction:
 4. Airborne Noise Reduction: Provide acoustical panels in layout designed by computer simulation based on Fitzroy formulas to provide the following sound reduction:
 - a. Band Rehearsal: 4.16 dB +/- 0.5dB.
 - b. Ensemble Rehearsal: 4.10 dB +/- 0.5dB.
 - c. Choral Rehearsal: 3.38 dB +/- 0.5dB.
 5. Reverberation Time: Provide acoustical panels in layout designed by computer simulation based on Fitzroy formulas to provide the following reverberation times and amount of variability available in each room:
 - a. Band Rehearsal: 0.79 +/- 0.2 seconds. Degree of change: 2.27 seconds.
 - b. Ensemble Rehearsal: 0.54 +/- 0.2 seconds. Degree of change: 0.84 seconds.

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- c. Choral Rehearsal: 0.98 +/- 0.2 seconds. Degree of change: 1.15 seconds
6. Reverberation Time: Provide acoustical absorber and diffuser panels in layout designed by computer simulation based on Fitzroy formulas to provide the following reverberation times:
7. Seismic Performance: Comply with ASCE 7, "Minimum Design Loads for Buildings and Other Structures": Section 9, "Earthquake Loads" based upon seismic design criteria indicated.
- 2.2 SOUND-ABSORBING WALL PANELS (WA-32, WA-32A, WA-80, WA-80A) & SOUND-DIFFUSING WALL PANELS (WD-32 & WD-80)
1. General: Provide sound absorbing and sound-diffusing panels meeting requirements of Performance Requirements Article and requirements of this Article, with the following characteristics:
- a. Wall Panel Mounting Types for Acoustical Performance Characteristics according to ASTM E 795, with measurements determined according to ASTM C 423:
- 1) A1: Mounted with 9/32 inch air space similar to actual practice.
 - 2) A: No air space.
 - 3) E-400: 16 inch (410 mm) air space.
2. Wall and Absorber Panels: Manufacturer's standard panel, with fabric covering adhered to front face of rigid glass-fiber board, with chemically hardened edges, with the following characteristics:
- a. Basis of Design Product: Wenger Wall Absorber Panel.
 - b. Acceptable Manufacturers: Kinetics Noise Control; AVL Systems; G&S Acoustics.
 - c. Absorber Panel Size: 3 inch (80 mm) thick, width and length indicated.
 - d. Fabric Covering: Manufacturer's standard, color and pattern as selected.
3. Convex Wall Diffuser Panels: Acoustically-configured, polycylindrical convex molded thermoplastic panel, .125 inch (3 mm) thick, width and length indicated, and with the following characteristics:
- a. Basis of Design Product: Wenger Type I Convex Wall Diffuser.
 - b. Acceptable Manufacturers: Kinetics Noise Control; AVL Systems; G&S Acoustics.
 - c. Fabric Covering: Manufacturer's standard, color and pattern as selected.
 - d. Wall Panel Mounting Method: Metal wall bracket with panel-mounted z-bracket.
 - e. Sound Transmission Class (STC): ASTM E 90 and ASTM E 413: 23.
4. Convex Wall Diffuser/Absorber Panels: Acoustically-configured, selectively sound-absorptive polycylindrical convex molded thermoplastic panel, .125 inch (3 mm) thick, width and length indicated, with sound attenuation board adhered to internal surface of panel.

- a. Basis of Design Product: Wenger Type II Convex Wall Diffuser Panels.
 - b. Acceptable Manufacturers: Kinetics Noise Control; AVL Systems; G&S Acoustics.
 - c. Fabric Covering: Manufacturer's standard, color and pattern as selected.
 - d. Wall Panel Mounting Method: Metal wall bracket with panel-mounted grooved button.
 - e. Sound Transmission Class (STC): ASTM E 90 and ASTM E 413: 23.
 - f.
5. Accessories
- a. Wall Brackets: Galvanized steel rail configured to accept grooved epoxy buttons or z-brackets attached to panel corners on concealed side.
6. Materials
- a. Low-Emitting Materials: Acoustic components shall comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 - b. Glass Fiber Board: ASTM C 612, Type 1A, 6 lb/cu. ft.
 - c. Thermoplastic Sheet: PVC acrylic plastic sheet,
 - d. Fabric Facing Material: 100 percent woven plain weave polyester 2-ply, with the following characteristics:
 - 1) Light Fastness: AATCC 16, Option 3: 40 hours.
 - 2) Fastness to Crocking: AATCC 8: #4 Wet & Dry.
 - 3) Flammability: ASTM E 84, Class A or 1.
 - 4) Basis of design product: Guilford of Maine, FR-701, Series 2100.

2.3 FABRICATION

- A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Edge Hardening: For glass-fiber board and mineral-fiber board cores, chemically harden core edges and areas of core where mounting devices are attached.
- C. Core-Face Layer: Evenly stretched over core face and edges and securely attached to core; free from puckers, ripples, wrinkles, or sags.
- D. Facing Material: Apply fabric facing fully covering visible surfaces of unit; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
 - 1. Square Corners: Tailor corners.
 - 2. Radius and Other Nonsquare Corners: Attach facing material so there are no seams or gathering of material.

3. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent units.
- E. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:
1. Thickness.
 2. Edge straightness.
 3. Overall length and width.
 4. Squareness from corner to corner.
 5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install units in locations indicated. Unless otherwise indicated, install units with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- C. Align fabric pattern and grain with adjacent units.

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch in 48 inches, noncumulative.
- B. Variation of Joint Width: Not more than 1/32-inch variation from hairline in 48 inches, noncumulative.

3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 09 84 33

SECTION 09 84 33 - ACOUSTICAL WALL PANELS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes shop-fabricated, acoustical panel units tested for acoustical performance, including the following:
 - 1. Acoustical metal panels.

1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.
- B. SAA: Sound Absorption Average.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include fabric facing, panel edge, core material, and mounting indicated.
- B. Shop Drawings: For unit assembly and installation.
 - 1. Include plans, elevations, sections, and mounting devices and details.
 - 2. Include details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge profile and core materials.
 - 3. Include details at cutouts and penetrations for other work.
- C. Samples for Verification: For the following products:
 - 1. Mounting Devices: Full-size Samples.
 - 2. Assembled Panels: Approximately 12 by 12 inches, including joints and mounting methods.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of unit.

- B. Sample Warranty: For manufacturer's special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of unit to include in maintenance manuals.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Lighting: Do not install units until a permanent level of lighting is provided on surfaces to receive the units.
- C. Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace units and components that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to the following:
 - a. Acoustical performance.
 - b. Warping of core.
 - 2. Warranty Period: One year from date of Material Completion.

PART 2 - PRODUCTS**2.1 ACOUSTICAL METAL PANELS (AWP-1A thru AWP-1C)**

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Gordon Incorporated (Basis of design: Alpro Wall Panel System)
 2. A.L. Harding & Company
 3. Kinetics Noise Control, Inc.
 4. Zahner Company
 5. ECKEL Noise Control Technologies (ECKEL Functional Panel)
- B. Components: All panels, J trim perimeter, corner angles and Z furring, including acoustical component shall be provided as a complete package of this work.
- C. Materials
1. Mounting Accessories: Extruded aluminum
 - a. Accessories shall include Z-furring, J Trim and inside/outside corner angles in a size and length to completely support and finish trim the wall panels as shown in elevations. All mounting accessories shall be finished to match wall panels.
 - b. Aluminum Extrusions shall be 6063-T6 alloy. (ASTM B 221, ASTM B 221 M)
 2. General: Provide metals free from surface blemishes where exposed to view in finished unit. Surfaces that exhibit pitting, seam marks, roller marks, stains, and discolorations, or other imperfections on finished units are not acceptable. All metal shall be of the highest grade -commercial type.
 - 3.
 4. Metal Panels: Aluminum sheet shall be 3003-H14 alloy, minimum .032", (ASTM B 209), corrugated and perforated with 1/8" diameter holes on 21/64" staggered centers, approximately 13% open area.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Examine fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Space Enclosure: Do not install any work until space is enclosed and weatherproofed, wet-work in space is completed and nominally dry, work above ceilings is complete, and temperature and humidity is continuously maintained at values near those of final occupancy.
- B. Install units in locations indicated. Unless otherwise indicated, install units with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- C. Comply with manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.

3.3 INSTALLATION TOLERANCES

- A. Tolerances: Install wall panel system with a maximum surface deviation of 1/8" in 4'-0" (No load applied) ASTM 635-92.

3.4 CLEANING

- A. Clean all surfaces following installation.
- B. Replace material having scratches, abrasions, or other defects, with unblemished panels, or suspension.
- C. Maintenance per manufacturer's finish maintenance instructions.
- D.
- E. END OF SECTION 09 84 33

SECTION 09 91 13 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Primers.
- 2. Finish coatings.

- B. Related Requirements:

- 1. Section 05 12 00 "Structural Steel Framing" for shop priming of metal substrates.
- 2. Section 05 50 00 "Metal Fabrications" for shop priming metal fabrications.

1.3 ACTION SUBMITTALS

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

- 1. Include preparation requirements and application instructions.
- 2. Indicate VOC content.

- B. Samples for Initial Selection: For each type of topcoat product.

- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.

- 1. Submit Samples on rigid backing, 8 inches square.
- 2. Apply coats on Samples in steps to show each coat required for system.
- 3. Label each coat of each Sample.
- 4. Label each Sample for location and application area.

- D. Product Schedule: Use same designations indicated on Drawings and in the Exterior Painting Schedule to cross-reference paint systems specified in this Section. Include color designations.

1.4 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint Products: 5 percent, but not less than 1 gal. of each material and color applied.

1.5 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
 1. Architect will select one surface to represent surfaces and conditions for application of each paint system.
 - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
 - b. Other Items: Architect will designate items or areas required.
 2. Final approval of color selections will be based on mockups.
 - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 1. Maintain containers in clean condition, free of foreign materials and residue.
 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:

1. Devoe High Performance Coatings
2. Benjamin Moore Paints
3. PPG Industries, Inc.
4. The Sherwin-Williams Company

B. Source Limitations: Obtain each paint product from single source from single manufacturer.

2.2 PAINT PRODUCTS, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by topcoat manufacturer for use in paint system and on substrate indicated.

B. Colors: As indicated on the Room Finish Schedule.

2.3 PRIMERS

A. Exterior, Alkali-Resistant, Water-Based Primer: Pigmented, water-based primer formulated for use on alkaline surfaces, such as exterior plaster, vertical concrete, and masonry.

B. Exterior, Latex Block Filler: Water-based, pigmented, high-solids, emulsion coating formulated to bridge and fill porous surfaces of exterior concrete masonry units in preparation for specified subsequent coatings.

1. Minimum Solids Content: Manufacturer's standard percentage solids by volume.

C. Solvent-Based Bonding Primer: Pigmented, solvent-based primer formulated for exterior use and to seal substrates and promote adhesion of specified subsequent coatings.

D. Water-Based, Rust-Inhibitive Primer: Corrosion-resistant, water-based-emulsion primer formulated for resistance to flash rusting when applied to cleaned, exterior ferrous metals subject to mildly corrosive environments.

E. Alkyd Metal Primer: Corrosion-resistant, solvent-based, alkyd primer formulated for use on prepared ferrous metals subject to industrial and light marine environments.

F. Water-Based, Galvanized-Metal Primer: Corrosion-resistant, pigmented, acrylic primer; formulated for use on cleaned/etched, exterior, galvanized metal to prepare it for subsequent water-based coatings.

2.4 FINISH COATINGS

- A. Exterior Latex Paint, Semigloss: Water-based, pigmented emulsion coating formulated for alkali, mold, microbial, and water resistance and for use on exterior surfaces, such as masonry, portland cement plaster, and primed wood and metal.
 - 1. Gloss Level: Manufacturer's standard semigloss finish.
- B. Exterior, High-Build Latex Paint: Water-based, high-build, pigmented, emulsion coating; high-solids content improves filling, uniformity, and film build on concrete masonry surfaces. Formulated for abrasion, mold, microbial, and wind-driven rain resistance and for use on exterior masonry, concrete masonry unit, and concrete surfaces.
 - 1. Gloss and Sheen Level: Manufacturer's standard low-gloss finish.
 - 2. Minimum Solids Content: Manufacturer's standard percentage solids by volume.
- C. Exterior Alkyd Enamel, Semigloss: Solvent-based, pigmented, alkyd enamel formulated for mold, microbial, and water resistance and for use on exterior, primed, wood and metal surfaces.
 - 1. Gloss Level: Manufacturer's standard semigloss finish.
- D. Quick-Drying Alkyd Enamel, Semigloss: Solvent-based, alkyd or modified-alkyd enamel formulated for quick-drying capabilities and for use on exterior, primed, metal and dimensionally stable wood surfaces.
 - 1. Gloss Level: Manufacturer's standard semigloss finish.
- E. Aluminum Paint: Aliphatic, solvent-based coating consisting of varnish or alkyd binder combined with aluminum pigment that is formulated for use as a stain-blocking coating and sealer on exterior wood, metal, bituminous-coated, and prepared masonry surfaces and to be able to be recoated with conventional alkyd and latex paints.
- F. High-Build Epoxy Paint, Low Gloss: High-solids, two-component epoxy; formulated for use on exterior concrete, masonry, and primed-metal surfaces.
 - 1. Gloss and Sheen Level: Manufacturer's standard low-gloss finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.

2. Masonry (Clay and Concrete Masonry Units): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.

- C. Exterior Gypsum Board Substrates: Verify that finishing compound is dry and sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility, with finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems specified in this Section.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 INSTALLATION

- A. Apply paints in accordance with manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in the Exterior Painting Schedule may be omitted on items that are factory primed or factory finished if compatible with intermediate and topcoat coatings and acceptable to intermediate and topcoat paint manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written instructions, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written instructions.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

1. Do not clean equipment with free-draining water and prevent solvents, thinners, cleaners, and other contaminants from entering into waterways, sanitary and storm drain systems, and ground.
 2. Dispose of contaminants in accordance with requirements of authorities having jurisdiction.
 3. Allow empty paint cans to dry before disposal.
 4. Collect waste paint by type and deliver to recycling or collection facility.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Design Professional, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

A. Steel and Iron Substrates:

1. Alkyd System:

- a. Prime Coat: Alkyd metal primer, anticorrosive for metal.
- b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
- c. Topcoat: Exterior alkyd enamel, gloss.

B. Galvanized-Metal Substrates, including hollow metal frames:

1. Alkyd System:

- a. Prime Coat: Water-based, galvanized-metal primer, as recommended in writing by topcoat manufacturer for exterior use on galvanized-steel substrates with topcoat indicated.
- b. Intermediate Coat: Exterior alkyd enamel matching topcoat.
- c. Topcoat: Exterior, alkyd, light industrial coating, gloss.

END OF SECTION 09 91 13

SECTION 09 91 23 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Concrete.
 - 2. Concrete masonry units (CMUs).
 - 3. Steel and iron.
 - 4. Wood.
 - 5. Gypsum board.
- B. Related Requirements:
 - 1. Section 05 12 00 "Structural Steel Framing" for shop priming structural steel.
 - 2. Section 05 50 00 "Metal Fabrications" for shop priming metal fabrications.
 - 3. Section 05 51 13 "Metal Pan Stairs" for shop priming metal pan stairs.

1.3 DEFINITIONS

- A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D523.
- B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D523.
- D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D523.
- E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D523.
- F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D523.
- G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
 - 1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 2. Indicate VOC content.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches square.
 - 2. Apply coats on Samples in steps to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.8 FIRE CODE REQUIREMENTS

- A. Corridor partitions, smoke partitions, fire walls, area separation partitions, horizontal exit partitions, exit enclosures, and other fire partitions and ceiling fire rated assemblies and other areas as required by Fire Marshal (state and local) having jurisdiction, shall be effectively and permanently identified with signs or stenciling in manner acceptable to such authority.
1. Paint such identification above decorative ceiling in concealed spaces and in mechanical rooms.
 2. Frequency of signage shall be as required by the Fire Marshal but shall be no greater than 10'-0" on center for full length of wall. Min. height 3 inches.
 3. Identification shall occur on both sides of partitions.
 4. Identification shall occur on exposed side of fire rated assemblies.
 5. Suggested Wording:
 - a. Smoke Partition: "Smoke Barrier – Protect All Openings."
 - b. 1.0 Hour Partition: "Smoke and 1.0 Hour Fire Barrier – Protect All Openings."
 - c. 2.0 Hour Partition: "Smoke and 2.0 Hour Fire Barrier – Protect All Openings."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Subject to compliance with requirements, provide products by one of the following:
1. Devoe High Performance Coatings
 2. Benjamin Moore Paints
 3. PPG Industries, Inc.
 4. The Sherwin-Williams Company

2.2 PAINT, GENERAL

- A. Material Compatibility:
1. Materials for use within each paint system shall be compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
- B. Colors: As indicated on the Room Finish Schedule.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMUs): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
- G. Wood Substrates:
 - 1. Scrape and clean knots and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Surfaces to be painted:
 - 1. Except where natural finish of material specifically noted as surface not painted, paint exposed surfaces whether or not colors designated in "schedules".
 - 2. Where items or surfaces not specifically mentioned, paint same as similar adjacent materials or areas.

3. If color or finish not designated, Architect will select from standard colors or finishes available.
4. The following categories of work not included as part of field-applied finish work.
 - a. Pre-Finished Items: Unless otherwise indicated, do not include painting when factory-finishing or installer-finishing specified for such items as (but not limited to) follows:
 - 1) Acoustic materials
 - 2) Architectural woodwork and casework.
 - 3) Wood Doors
 - 4) Finished mechanical and electrical equipment.
 - 5) Light fixtures.
 - 6) Switchgear and distribution cabinets.
 - b. Concealed Surfaces: Unless otherwise indicated, painting not required on surfaces such as follows:
 - 1) Walls or ceilings in concealed areas.
 - 2) Generally inaccessible areas.
 - 3) Foundation spaces.
 - 4) Furred areas.
 - c. Finished Metal Surfaces: Unless otherwise indicated, similar finished metal surfaces listed below do not require painting:
 - 1) Anodized aluminum.
 - 2) Stainless steel.
 - 3) Chromium plate.
 - d. Operating Parts: Unless otherwise indicated, moving parts of operating units, mechanical and electrical parts, such as follows, do not require painting:
 - 1) Valve and damper operators.
 - 2) Linkages.
 - 3) Sensing devices.
 - 4) Motor and fan shafts.
5. Following categories of work included under other Sections.
 - a. Shop Primers: Unless otherwise specified, shop priming ferrous metal items included under various Sections for structural steel, metal fabrications, hollow metal work and similar items.
 - b. Unless otherwise specified, shop priming of fabricated components such as architectural woodwork, wood casework and shop fabricated or factory-built mechanical and electrical equipment or accessories included under other Sections.
6. Mechanical and Electrical Work: Painting of mechanical and electrical work specified in Divisions 23 and 26, respectively.

3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
 - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
 - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Design Professional, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

- A. Concrete Substrates, Traffic Surfaces:
 - 1. Water-Based Concrete Floor Sealer System:
 - a. First Coat: Sealer, water based, for concrete floors, matching topcoat.
 - b. Topcoat: Sealer, water based, for concrete floors.
- B. CMU Substrates:
 - 1. Water-Based Light Industrial Coating System (Pre-Catalyzed Epoxy):
 - a. Block Filler: Block filler, latex, interior/exterior.
 - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, interior, water based (MPI Gloss Level 3).
- C. Steel Substrates:
 - 1. Institutional Low-Odor/VOC Latex System MPI INT 5.1S:

- a. Prime Coat: Primer, rust inhibitive, water based MPI #107, tinted to match topcoat.
 - b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.
 - c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5).
- D. Wood Substrates: Wood trim.
1. Water-Based Light Industrial Coating System:
 - a. Prime Coat: Primer sealer, alkyd, interior, MPI #45, tinted to match topcoat.
 - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, interior, water based, semi-gloss (MPI Gloss Level 5).
- E. Wood Substrates: Traffic surfaces, including floors.
1. Latex Porch & Floor Enamel System:
 - a. Prime Coat: Primer sealer, alkyd, interior.
 - b. Intermediate Coat: Floor paint, latex, matching topcoat.
 - c. Topcoat: Floor paint, latex, matte.
- F. Gypsum Board Substrates:
1. Water-Based Light Industrial Coating System (Pre-Catalyzed Epoxy):
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50, tinted to match topcoat.
 - b. Intermediate Coat: Light industrial coating, interior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, interior, water based, semi-gloss (MPI Gloss Level 5).

END OF SECTION 09 91 23

SECTION 10 11 00 - VISUAL DISPLAY UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Display rails.
 - 2. Markerboard Panels.
 - 3. Tackboard Panels.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units.
- B. Shop Drawings: For visual display units.
 - 1. Include plans, elevations, sections, details, and attachment to other work.
- C. Samples for Initial Selection: For each type of visual display unit indicated, for units with factory-applied color finishes, and as follows:
 - 1. Samples of facings for each visual display panel type, indicating color and texture.
 - 2. Fabric swatches of fabric facings for tackboards.
 - 3. Include accessory Samples to verify color selected.
- D. Product Schedule: For visual display units.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranties: For manufacturer's special warranties.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-fabricated visual display units completely assembled in one piece. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install visual display units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.7 WARRANTY

- A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Surfaces lose original writing and erasing qualities.
 - b. Surfaces exhibit crazing, cracking, or flaking.
 2. Warranty Period: Life of the building.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: 25 or less.
 2. Smoke-Developed Index: 25 or less.

2.2 DISPLAY RAILS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. ASI Visual Display Products
 2. Best-Rite Manufacturing
 3. Claridge Products & Equipment, Inc.
 4. Ghent

5. AARCO Products, Inc.

- B. Aluminum Display Rail: Manufacturer's standard, extruded-aluminum display rail with plastic-impregnated-cork tackable insert, designed to hold accessories.
- C. Tackable Insert Color: As selected by Design Professional from full range of industry colors.
- D. Size: 2 inches high by length indicated on Drawings.
- E. End Stops: Aluminum.
- F. Accessories:
 - 1. Metal Map Hooks: Include two map hooks per 20feet.
 - 2. Roller Brackets: Include two roller brackets per 20feet of installed display rail.

2.3 MARKERBOARD PANELS MP-1

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. ASI Visual Display Products
 - 2. Best-Rite Manufacturing
 - 3. Claridge Products & Equipment, Inc.
 - 4. Ghent
 - 5. AARCO Products, Inc.
- B. Porcelain-Enamel Markerboard Panels: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction, consisting of moisture-barrier backing, core material, and porcelain-enamel face sheet with low-gloss finish. Laminate panels under heat and pressure with manufacturer's standard, flexible waterproof adhesive.
 - 1. Particleboard Core: 3/8 inch thick; with 0.005-inch-thick, aluminum foil backing.
 - 2. Laminating Adhesive: Manufacturer's standard moisture-resistant thermoplastic type.

2.4 TACKBOARD PANELS TB-1

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. ASI Visual Display Products
 - 2. Best-Rite Manufacturing
 - 3. Claridge Products & Equipment, Inc.
 - 4. Ghent
 - 5. AARCO Products, Inc.
- B. Tackboard Panels:

1. Facing: Vinyl fabric factory laminated to 1/4-inch- thick, cork sheet.
2. Core: Manufacturer's standard.

2.5 MATERIALS

- A. Porcelain-Enamel Face Sheet: PEI-1002, with face sheet manufacturer's standard two- or three-coat process.
- B. Plastic-Impregnated-Cork Sheet Tackboard Facing: Seamless, homogeneous, self-sealing sheet consisting of granulated cork, linseed oil, resin binders, and dry pigments that are mixed and calendared onto fabric backing; with washable vinyl finish and integral color throughout; with surface-burning characteristics indicated.
- C. Vinyl Fabric: Mildew resistant, washable, complying with ASTM F793/F793M, Type II,; weighing not less than 13 oz./sq. yd. with surface-burning characteristics indicated.
- D. Extruded Aluminum: ASTM B221, Alloy 6063.

2.6 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Examine walls and partitions for proper preparation and backing for visual display units.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances, such as dirt, mold, and mildew, that could impair the performance of and affect the smooth, finished surfaces of visual display boards.
- C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces.

3.3 INSTALLATION

- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- B. Visual Display Board Assembly Mounting Heights: Install visual display units at mounting heights indicated on Drawings..
- C. Display Rails: Install rails at mounting heights indicated on Drawings, or if not indicated, at height indicated below. Attach to wall surface with fasteners at not more than 16 inches o.c.

3.4 CLEANING AND PROTECTION

- A. Clean visual display units in accordance with manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect visual display units after installation and cleaning.

END OF SECTION 10 11 00

SECTION 10 13 00 - DIRECTORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Nonilluminated message-strip directories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for directories.
 - 2. Include furnished specialties and accessories.
- B. Shop Drawings: For directories.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Include sections of typical trim members.
 - 3. Indicate layout directory, including header and message strips.
- C. Samples: For each exposed product and for each color and texture specified.
 - 1. Trim: 6 inches long for profile and color of factory finish.
 - 2. Message Strip: Length as indicated for finished product for profile and mounting configuration.
 - 3. Typeface Sample for size and font.
 - 4. Letterboard Panel: Not less than 8-1/2 by 11 inches.
 - 5. Changeable Letters: Six full-size letters indicating size and font.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For directories to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
1. Flame-Spread Index: 25 or less.
 2. Smoke-Developed Index: 25 or less.

2.2 NONILLUMINATED AND FRONT-ILLUMINATED MESSAGE-STRIP DIRECTORIES

- A. Manufacturers: Subject to compliance with requirements, product products by one of the following:
1. APCO Graphics, Inc.
 2. ASI Sign Systems, Inc.
 3. SignGroup/Karman
- B. Metal Frame: Directory with full perimeter metal frame and sheet metal rear cover, housing changeable message strips in configuration indicated.
1. Perimeter Frame:
 - a. Material: Extruded aluminum.
 - b. Profile: Square.
 - c. Corners: Square.
 - d. Depth: Manufacturer's standard 1-3/4- to 2-3/4-frame depth.
 2. Cover: Cover for each section of message strips with full-length concealed hinge. Equip with cylinder lock(s).
 - a. Frame: Same material and finish as perimeter frame.
 - b. Glazing: Clear tempered glass.
 3. Number of Columns: Two columns of message strips.
 4. Mounting: Surface.
 5. Header Panel: Full width of directory, by 4 inches high.
 6. Divider Strips: Provide divider strips between columns of message strips, and between header and message strips.
 - a. Color: As selected by Architect from full range of industry colors.
 7. Aluminum Finish: Color anodic.
 - a. Color: As selected by Architect from full range of industry colors.

- C. Message Strips: Provide message strips compatible with directory system selected, with message copy indicated in message-strip schedule.
1. Type:
 - a. Acrylic or high-pressure plastic-laminate strips with machine- or laser-engraved copy, which exposes contrasting core.
 2. Width: 11 inches long.
 3. Height: 1 inch.
 4. Color:
 - a. Message-Strip Background: As selected by Design Professional from manufacturer's full range.
 - b. Lettering: As selected by Design Professional from manufacturer's full range.
 5. Lettering:
 - a. Letter Height: 1/4 inch.
 - b. Font Style: As selected by Design Professional.
 - c. Case: All capitals.
 6. Header Graphics: Provide copy that complies with requirements indicated on artwork supplied on electronic media by Owner for size, style, spacing, content, height, location, material, and colors of graphics.
 7. Graphics Panel: Screen-printed graphics or vinyl graphics laminated to opaque acrylic sheet; held in place by interchangeable, interlocking plastic carrier. Provide graphics that comply with requirements indicated on artwork supplied on electronic media by Architect for size, style, spacing, content, height, location, material, and colors.
 8. Width: 24 inches.
 9. Height: 36 inches.

2.3 MATERIALS

- A. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
1. Sheet: ASTM B209.
 2. Extruded Shapes: ASTM B221, Alloy 6063.
- B. Translucent Acrylic Sheet: ASTM D4802, Category A-1 (cell-cast sheet), with Finish 1 (smooth or polished), white-colored sheet of density required to produce uniform brightness and minimum halation effects.
- C. Fasteners: Provide screws, bolts, and other fastening devices made from same material as items being fastened, except provide hot-dip galvanized, stainless steel, or aluminum fasteners for exterior applications. Provide types, sizes, and lengths to suit installation conditions. Use security fasteners where exposed to view.

2.4 FABRICATION

- A. Fabricate directories to requirements indicated for dimensions, design, and thickness and finish of materials. Use metals and shapes of thickness and reinforcement to produce flat surfaces, free of oil canning, and to impart strength for size, design, and application indicated.
- B. Message-Strip Directories: Provide blank message strips for each carrier in entire directory.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM/NOMMA 500 for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Examine walls and partitions for proper backing for directories.
- C. Examine walls and partitions for suitable framing depth if recessed directories will be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install directories with perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- B. Mounting Height: Install directories at mounting heights indicated on Drawings, or if not indicated, at 72 inches above finished floor to top of directory.

- C. Surface-Mounted Directories: Attach directories to wall framing with concealed clips, hangers, or grounds fastened at not more than 16 inches o.c. Secure both top and bottom of directories to walls.

3.3 ADJUSTING AND CLEANING

- A. Adjust directory doors to operate smoothly without warp or bind and so that contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.

END OF SECTION 10 13 00

SECTION 10 14 16 - PLAQUES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes metal plaques. One required, 24"x36". Coordinate location with Design Professional.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For plaques.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show plaque mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 3. Show message list, timesteps, graphic elements, including raised characters, and layout for each plaque at least half size.
- C. Samples for Initial Selection: For each type of plaque, exposed component, and exposed finish.
 - 1. Include representative Samples of available timesteps and graphic symbols.
- D. Product Schedule: For plaques. Use same designations indicated on Drawings or specified.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For plaques to include in maintenance manuals.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of plaques that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - 2. Warranty Period: Five years from date of Material Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".

2.2 PLAQUES

- A. Cast Plaque: Cast-metal plaque with background texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Ace Sign Systems, Inc.
 - b. APCO Graphics, Inc.
 - c. A.R.K. Ramos Architectural Signage Systems
 - d. Diskey Sign Company
 - e. Erie Landmark Company
 - f. Gemini Inc.
 - g. Metal Arts Foundry
 - h. Metallic Arts
 - 2. Plaque Material: Cast bronze.
 - 3. Finishes:
 - a. Overcoat: Manufacturer's standard baked-on clear coating.
 - 4. Background Texture: Pebble.

5. Integrally Cast Border Style: Square single line, polished.
6. Mounting: Concealed studs.
7. Text and Typeface: Accessible raised characters Times Roman.

2.3 MATERIALS

- A. Bronze Castings: ASTM B584, alloy recommended by manufacturer and finisher for finish indicated.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of plaques, noncorrosive and compatible with each material joined, and complying with the following:
 1. Plaque Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of plaque, screwed into back of plaque, or screwed into tapped lugs cast integrally into back of plaque unless otherwise indicated.

2.5 FABRICATION

- A. General: Provide manufacturer's standard plaques according to requirements indicated.
 1. Preassemble plaques in the shop to greatest extent possible. Disassemble plaques only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 5. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match plaque finish.
 6. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

2.6 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.7 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Verify that plaque-support surfaces are within tolerances to accommodate plaques without gaps or irregularities between backs of plaques and support surfaces unless otherwise indicated.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install plaques using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install plaques level, plumb, true to line, and at locations and heights indicated, with plaque surfaces free of distortion and other defects in appearance.
 - 2. Install plaques so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that plaque surfaces are clean and free of materials or debris that would impair installation.
- B. Mounting Methods:
 - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of plaque. Remove loose debris from hole and substrate surface.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed plaques and plaques that do not comply with specified requirements. Replace plaques with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as plaques are installed.
- C. On completion of installation, clean exposed surfaces of plaques according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain plaques in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 16

SECTION 10 14 19 - DIMENSIONAL LETTER SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Cast dimensional characters.

1.3 ACTION SUBMITTALS

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

- B. Shop Drawings: For signs.

- 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.

- C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

- 1. Include representative Samples of available typestyles and graphic symbols.

- D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

- 1. Dimensional Characters: Half-size Sample of dimensional character.
 - 2. Full-size Samples, if approved, will be returned to Contractor for use in the Project.

- E. Product Schedule: For dimensional letter signs. Use same designations indicated on Drawings or specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.

- B. Sample Warranty: For special warranty.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: Five years from date of Material Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design sign structure and anchorage of dimensional character sign type(s) according to structural performance requirements.
- B. Structural Performance: Signs and supporting elements shall withstand the effects of gravity and other loads within limits and under conditions indicated.
 - 1. Uniform Wind Load: As indicated on Drawings.

2.2 DIMENSIONAL CHARACTERS

- A. Cast Characters: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:
 - 1. Character Material: Cast aluminum.
 - 2. Character Height: As indicated on Drawings.
 - 3. Thickness: Manufacturer's standard for size of character.
 - 4. Finishes:
 - a. Integral Aluminum Finish: Anodized color as selected by Architect from full range of industry colors and color densities.

5. Mounting: Projecting studs. Stand off exterior wall approximately 2 inches. Stand off interior wall approximately ½" inch.
6. Typeface: Times Roman.

2.3 DIMENSIONAL CHARACTER MATERIALS

- A. Aluminum Castings: ASTM B26/B26M, alloy and temper recommended by sign manufacturer for casting process used and for type of use and finish indicated.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
 1. Use concealed fasteners and anchors unless indicated to be exposed.
 2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
 3. Exposed Metal-Fastener Components, General:
 - a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
 4. Sign Mounting Fasteners:
 - a. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.

2.5 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 5. Internally brace dimensional characters for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
 6. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

7. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast, and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

2.6 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.7 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 19

SECTION 10 14 23 - PANEL SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Internally illuminated panel signs.

1.3 DEFINITIONS

- A. Illuminated: Illuminated by lighting source integrally constructed as part of the sign unit.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For panel signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 3. Show message list, tpestyles, graphic elements, and layout for each sign at least half size.
 - 4. Show locations of electrical service connections.
 - 5. Include diagrams for power, signal, and control wiring.
- C. Delegated-Design Submittal: For signs indicated in "Performance Requirements" Article.
 - 1. Include structural analysis calculations for signs indicated to comply with design loads; signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Variable Component Materials: 12 replaceable text inserts and interchangeable characters (letters, numbers, and graphic elements) of each type.
 - 2. Tools: One set(s) of specialty tools for assembling signs and replacing variable sign components.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer of products or [An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify locations of anchorage devices and electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: Five years from date of Material Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design sign structure and anchorage of internally illuminated panel sign type(s) according to structural performance requirements.

- B. Structural Performance: Signs and supporting elements shall withstand the effects of gravity and other loads within limits and under conditions indicated.
1. Uniform Wind Load: As indicated on Drawings.
 2. Concentrated Horizontal Load: As indicated on Drawings.
 3. Other Design Load: As indicated on Drawings.
 4. Uniform and concentrated loads need not be assumed to act concurrently.
- C. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 PANEL SIGNS

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Daktronics Galaxy Monochrome 3500 Series (basis-of-design: 3'-3" x 9'-3" Galaxy 16mm, 48x160 Matrix RGB Outdoor LED Color Display, 3550 Series Model #: AF-3550-48x160-16-RGB-2V).
 - b. AAA Sign Company, Augusta
 - c. Whitefield Sign Company, Statesboro

2.3 PANEL-SIGN MATERIALS

- A. Aluminum Sheet and Plate: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Aluminum Extrusions: ASTM B221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Paints and Coatings for Sheet Materials: Inks, dyes, and paints that are recommended by manufacturer for optimum adherence to surface and are UV and water resistant for colors and exposure indicated.

2.4 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following unless otherwise indicated:
1. Use concealed fasteners and anchors unless indicated to be exposed.
 2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.

3. Inserts: Furnish inserts to be set by other installers into concrete or masonry work.

2.5 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 1. Preassemble signs in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 5. Internally brace signs for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that anchorage devices embedded in permanent construction are correctly sized and located to accommodate signs.
- D. Verify that electrical service is correctly sized and located to accommodate signs.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 2. Install signs so they do not protrude or obstruct according to the accessibility standard.

3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 23

SECTION 10 14 23.16 - ROOM-IDENTIFICATION PANEL SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes room-identification signs that are directly attached to the building.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.4 COORDINATION

- A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For room-identification signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
 - 3. Show message list, typestyles, graphic elements, including raised characters and Braille, and layout for each sign at least half size.
- C. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 - 1. Room-Identification Signs: Full-size Sample.
 - 2. Variable Component Materials: Full-size Sample of each base material, character (letter, number, and graphic element) in each exposed color and finish not included in Samples above.
 - 3. Exposed Accessories: Full-size Sample of each accessory type.
 - 4. Full-size Samples, if approved, will be returned to Contractor for use in Project.

- D. Product Schedule: For room-identification signs. Use same designations indicated on Drawings or specified.

1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For signs to include in maintenance manuals.

1.8 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Variable Component Materials: 12 replaceable text inserts and interchangeable characters (letters, numbers, and graphic elements) of each type.
 - 2. Tools: One set(s) of specialty tools for assembling signs and replacing variable sign components.

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify locations of anchorage devices embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: Five years from date of Material Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".

2.2 ROOM-IDENTIFICATION SIGNS

- A. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. APCO Graphics, Inc.
 - b. Architectural Graphics Inc.
 - c. ASI Sign Systems, Inc.
 - d. Mohawk Sign Systems
 - e. Multi-graphics Incorporated
 - f. The Supersine Company
 - g. Vomar Products Inc.
 - h. Avalis Wayfinding Solutions Inc.
 2. Laminated-Sheet Sign: High pressure engraving stock with face and core plies in contrasting color over subsurface graphics phenolic backing sheet to produce composite sheet.
 - a. Composite-Sheet Thickness: 0.125 inch.
 - b. Color(s): As selected by Architect from manufacturer's full range.
 - c. Sign Size: Minimum 6" x 6" but as required to maintain a minimum 1" between lettering and edge.
 3. Sign-Panel Perimeter: Finish edges smooth.
 - a. Edge Condition at Vertical Edges and at Horizontal Edges: Square cut.
 - b. Corner Condition in Elevation: Rounded to radius indicated.
 4. Mounting: Surface mounted to wall with concealed anchors.
 5. Text and Typeface: Helvetica Medium C, all same height, minimum 1 inch..
 6. Graphic Image Process:
 - a. Graphic content and style: Provide sign copy to comply with requirements indicated for sizes, style, spacing, content, positions, materials, finishes and colors of letters, numbers, symbols and other graphic devices.
 - b. Pictograms:

- 1) All pictograms based on international symbols and those developed by the U.S Department of Transportation.
 - 2) Accompany by verbal and braille description below pictogram.
 - 3) Required pictograms:
 - a) Accessibility symbol.
7. Pictogram plaques same as interior door plaques. Sand-cut of Machine-cut Engraved Copy – Raised Characters:
- a. Sand-cut or machine-cut background to produce raised letters, numbers, symbols and other graphic devices on sign panel on face indicated to provide precisely formed copy, with background incised to uniform depth.
 - b. If machine cut, use high speed cutters mechanically linked to master templates in pantographic system or equivalent process capable of producing characters of style indicated with sharply formed edges.
 - c. Plastic laminate: Cut through exposed face ply of plastic laminate sheet to expose contrasting core ply.
 - d. Produce copy to provide a minimum indentation depth of 1/32” and a minimum stroke width of 1/4”
8. Name Slot:
- a. Window: Clear plastic over slot for insertion of plastic strip containing copy by Owner.
 - 1) Required only at Corridor or Passage door locations of staff occupied areas.
 - 2) Size: 1” clear height, 7/8” viewing height by width of sign.
 - 3) As indicated.
 - 4) Provide back-coated .020” thick rigid vinyl insert 1/16” less than height of slot by full width of slot.
 - 5) Locate on sign as directed by Design Professional.
9. Copy Content:
- a. Refer to PART 3 of this Section for Locations.
 - b. Room Identification Signs:
 - 1) Room name, characters and braille.
 - 2) Room number, characters and braille.
 - c. Disabled Accessible Toilets:
 - 1) Accessibility symbol.
 - 2) Text “MEN”, “WOMEN”, “BOYS”, “GIRLS” or “TOILET” as applicable, characters and braille.

2.3 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
1. Use concealed fasteners and anchors unless indicated to be exposed.
 2. Sign Mounting Fasteners:
 - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material or screwed into back of sign assembly unless otherwise indicated.
 - b. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, and installed in predrilled holes.

2.4 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 LOCATIONS

- A. Room Identification:
1. Provide one sign for every interior door location except disabled accessible toilets.
 2. Install signs on wall at latch side of door outside space identified, centered 60" above finished floor.
- B. Disabled Accessible Toilets:
1. Provide one sign for every battery or individual toilet room containing provisions for disabled persons.
 2. Install signs on wall at push-pull or latch side of door outside space identified, centered 60" above finished floor.
- C. Exterior Service Rooms:
1. Provide one sign for every exterior room.
 2. Install signs on wall at latch side of door outside space identified, centered 60" above finished floor.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 - 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Accessibility: Install signs in locations on walls according to the accessibility standard.
- C. Mounting Methods:
 - 1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 10 14 23.16

SECTION 10 21 13.19 - PLASTIC TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Solid-plastic toilet compartments configured as toilet enclosures and urinal screens.

- B. Related Requirements:

- 1. Section 09 22 16 "Non-Structural Metal Framing" for blocking.
 - 2. Section 10 28 00 "Toilet and Bath Accessories" for accessories mounted on toilet compartments.

1.3 COORDINATION

- A. Coordinate requirements for overhead supports, blocking, reinforcing, and other supports concealed within wall and ceiling.

1.4 ACTION SUBMITTALS

- A. Product Data:

- 1. Solid-plastic toilet compartments:

- a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.

- B. Shop Drawings: For solid-plastic toilet compartments.

- 1. Include plans, elevations, sections, details, and attachment details.
 - 2. Show locations of cutouts for compartment-mounted toilet accessories.
 - 3. Show locations of centerlines of toilet fixtures.
 - 4. Show locations of floor drains.
 - 5. Show ceiling grid, ceiling-mounted items, and overhead support or bracing locations.

- C. Samples for Initial Selection: Manufacturer's standard color sheets, showing full range of available colors for each type of toilet compartment material indicated.

1. Include Samples of hardware and accessories involving material and color selection.
 - D. Samples for Verification: Actual sample of finished products for each type of toilet compartment indicated.
 1. Size: Manufacturer's standard size.
 2. Include each type of hardware and accessory.
 - E. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.
- 1.5 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For toilet compartments.
- 1.6 MAINTENANCE MATERIAL SUBMITTALS
- A. Extra Stock Material: Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Door Hinges: One hinge(s) with associated fasteners.
 2. Latch and Keeper: One latch(es) and keeper(s) with associated fasteners.
 3. Door Bumper: One bumper(s) with associated fasteners.
 4. Door Pull: One door pull(s) with associated fasteners.
 5. Fasteners: 10 fasteners of each size and type.
- 1.7 FIELD CONDITIONS
- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements, and coordinate before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire Performance: Tested in accordance with, and pass the acceptance criteria of, NFPA 286.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Department of Justice "2010 ADA Standards for Accessible Design" for toilet compartments designated as accessible.

2.2 SOLID-PLASTIC TOILET COMPARTMENTS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ASI Global Partitions
2. Bradley Corporation
3. General Partitions Mfg. Corp. Metpar Corporation
4. Partition Systems International of South Carolina
5. Scranton Products

B. Toilet-Enclosure Style: Overhead braced and [Floor anchored.

C. Urinal-Screen Style: Wall hung.

D. Door, Panel, Screen, and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, no-sightline system, and with homogenous color and pattern throughout thickness of material.

1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
2. Heat-Sink Strip: Manufacturer's standard continuous, stainless steel strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.
3. Color and Pattern: Two colors and patterns in each room as selected by Design Professional from manufacturer's full range.

E. Pilaster Shoes: Manufacturer's standard design; stainless steel.

F. Urinal-Screen Post: Manufacturer's standard post design of material matching the thickness and construction of pilasters; with shoe and sleeve (cap) matching that on the pilaster.

G. Brackets (Fittings):

1. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

H. Overhead Cross Bracing for Ceiling-Hung Units: As recommended by manufacturer and fabricated from solid polymer.

2.3 HARDWARE AND ACCESSORIES

A. Hardware and Accessories, Heavy Duty: Manufacturer's heavy-duty operating hardware and accessories.

1. Hinges: Manufacturer's minimum 0.062-inch- thick stainless steel paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees, allowing emergency access by lifting door. Mount with through bolts.
2. Latch and Keeper: Manufacturer's heavy-duty, surface-mounted, cast-stainless steel latch unit, designed to resist damage due to slamming, with combination rubber-faced door strike and keeper, and with provision for emergency access. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible. Mount with through bolts.
3. Coat Hook: Manufacturer's heavy-duty combination cast-stainless steel hook and rubber-tipped bumper, sized to prevent inswinging door from hitting compartment-mounted accessories. Mount with through bolts.

4. Door Bumper: Manufacturer's heavy-duty, rubber-tipped, cast-stainless steel bumper at outswinging doors. Mount with through bolts.
 5. Door Pull: Manufacturer's heavy-duty, cast-stainless steel pull at outswinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible. Mount with through bolts.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.4 MATERIALS

- A. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, Type 304, stretcher-leveled standard of flatness.
- B. Stainless Steel Castings: ASTM A743/A743M.

2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- D. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at tops and bottoms of posts. Provide shoes at posts to conceal anchorage.
- E. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, inswinging doors for standard toilet compartments and 36-inch- wide, outswinging doors with a minimum 32-inch-wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF PLASTIC TOILET COMPARTMENTS

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 - 2. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners, so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels and adjust, so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than 2 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust, so tops of doors are level with tops of pilasters when doors are in closed position.
- D. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on inswinging doors to hold doors open

approximately 30 degrees from closed position when unlatched. Set hinges on outswinging doors to return doors to fully closed position.

END OF SECTION 10 21 13.19

SECTION 10 28 00 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Public-use washroom accessories.
2. Public-use shower room accessories.
3. Private-use bathroom accessories.
4. Hand dryers.
5. Underlavatory guards.
6. Custodial accessories.

B. Related Requirements:

1. Section 09 30 13 " Tiling" for ceramic toilet and bath accessories.

1.3 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.
2. Include anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
3. Include electrical characteristics.

B. Samples: For each exposed product and for each finish specified, full size.

1. Approved full-size Samples will be returned and may be used in the Work.

C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

1. Identify locations using room designations indicated.
2. Identify accessories using designations indicated.

1.5 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For manufacturer's special warranties.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For accessories to include in maintenance manuals.

1.7 WARRANTY

A. Manufacturer's Special Warranty for Mirrors: Manufacturer agrees to repair or replace mirrors that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, visible silver spoilage defects.
2. Warranty Period: 10 years from date of Material Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Structural Performance: Design accessories and fasteners to comply with the following requirements:

1. Grab Bars: Installed units are able to resist 250 lbf concentrated load applied in any direction and at any point.
2. Shower Seats: Installed units are able to resist 250 lbf applied in any direction and at any point.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

A. Source Limitations: Obtain each type of public-use washroom accessory from single source from single manufacturer.

B. Toilet Tissue (Roll) Dispenser TT (provided by vendor):

1. Von Drehle Item #AE42N 9" Single JRT Dispenser

-
- C. Toilet Tissue (Jumbo-Roll) Dispenser TTJ(provided by vendor):
- D. Von Drehle Item #3253 JRT Dispenser Paper Towel (Folded) Dispenser PTF (provided by vendor):
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A&J Washroom Accessories
 - b. ASI
 - c. Bobrick Washroom Accessories (B-2620 Series)
 - d. Bradley Corporation
 2. Mounting: Surface mounted.
 3. Minimum Capacity: 400 C-fold or 525 multifold towels.
 4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
 5. Lockset: Tumbler type.
 6. Refill Indicator: Pierced slots at sides or front.
- E. Paper Towel (Roll) Dispenser PTR (provided by vendor):
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A&J Washroom Accessories
 - b. ASI
 - c. Bobrick Washroom Accessories (B-2680 Series)
 - d. Bradley Corporation
 2. Description: Pull-towel actuated mechanism permitting controlled delivery of paper rolls in preset lengths.
 3. Mounting: Recessed.
 4. Minimum Capacity: 8-inch- wide, 800-foot- long roll.
 5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
 6. Lockset: Tumbler type.
- F. Waste Receptacle <Insert drawing designation>:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A&J Washroom Accessories
 - b. Bobrick Washroom Accessories
 - c. Bradley Corporation
 2. Mounting: Surface mounted.
 3. Minimum Capacity: 12 gallon.
 4. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
 5. Liner: Reusable vinyl liner.
 6. Lockset: Tumbler type for waste receptacle.

G. Combination Towel (Folded) Dispenser/Waste Receptacle PTW:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A&J Washroom Accessories
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Accessories
 - d. Bradley Corporation
2. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle.
3. Mounting: Surface mounted with stainless steel collar.
 - a. Designed for nominal 4-inch wall depth.
4. Minimum Towel-Dispenser Capacity: 600 C-fold or 800 multifold paper towels.
5. Minimum Waste-Receptacle Capacity: 4 gal. or 12 gal..
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
7. Liner: Reusable, vinyl waste-receptacle liner.
8. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.

H. Multipurpose Soap/Towel Dispenser Unit SPT:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A&J Washroom Accessories
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Accessories
 - d. Bradley Corporation
2. Description: Combination unit for dispensing soap in lather form and folded towels.
3. Mounting: Surface mounted with stainless steel collar and mirror.
4. Minimum Soap-Dispenser Capacity: 80 oz..
5. Minimum Towel-Dispenser Capacity: 600 C-fold or 800 multifold towels.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin) for unit body and soap valve.
7. Lockset: Tumbler type.

I. Soap Dispenser SD (provided by vendor):

1. Product: Spartan Lite'N Foamy Foam Dispenser (975700), White
2. Description: Designed for manual operation and dispensing soap in lather form.
3. Mounting: Vertically oriented, surface mounted.
4. Refill Indicator: Window type.

J. Grab Bar GB 36 & GB42:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A&J Washroom Accessories
 - b. Bobrick Washroom Accessories
 - c. Bradley Corporation
 - d. Gamco
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, ASTM A480/A480M No. 4 finish (satin).
4. Outside Diameter: 1-1/2 inches.
5. Configuration and Length: As indicated on Drawings.

K. Sanitary-Napkin and Tampon Vendor SPV:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A&J Washroom Accessories
 - b. Bobrick Washroom Accessories
 - c. Bradley Corporation
2. Mounting: Surface mounted.
3. Capacity: 30/20.
4. Operation: No coin (free).
5. Exposed Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
6. Lockset: Tumbler type with separate lock and key for coin box.

L. Sanitary-Napkin Disposal Unit SDU:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A&J Washroom Accessories
 - b. Bobrick Washroom Accessories
 - c. Bradley Corporation
2. Mounting: Surface mounted.
3. Door or Cover: Self-closing, disposal-opening cover and hinged face panel with tumbler lockset.
4. Receptacle: Removable.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

M. Seat-Cover Dispenser SCD:

1. Mounting: Surface mounted.
2. Minimum Capacity: 250 seat covers.

3. Exposed Material and Finish: ABS plastic, gray.
4. Lockset: Tumbler type.

N. Mirror Unit MM & MM2:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. American Specialties, Inc. 0600 Series
 - b. Bobrick Washroom Accessories B-290 Series
 - c. Bradley Corporation
2. Frame: Stainless steel angle, 0.05 inch thick.
 - a. Corners: Manufacturer's standard.
3. Mirror: ¼" thick acrylic, mirrorized, clear acrylic sheet with silvering applied to back surface (vacuum deposition process), abrasion-resistant surface coating on exposed face
4. Size: As indicated on Drawings.
5. Hangers: Manufacturer's standard rigid, tamper and theft resistant.

O. Hook RH:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A&J Washroom Accessories
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Accessories
 - d. Bradley Corporation
2. Description: Single-prong unit.
3. Mounting: Exposed.
4. Material and Finish: Stainless steel, ASTM A480/A480M No. 7 finish (polished).

P. Adjustable Height Adult Changing Station DCS:

1. Manufacturers: Subject to compliance with requirements, provide products by the following:
 - a. AmeraProducts, Inc.
 - b. Koala Kare
 - c. Safe-T-Strap
2. Description: Height adjustable horizontal unit electrically operated with wired hand control and with safety rail and receiver tray.
 - a. Engineered to support minimum of 400-lb static load when opened.
3. Mounting: Surface mounted, foldable by pneumatic shock-absorbing mechanism.

4. Electrical Characteristics: Manufacturer's standard actuator and control system, with integrated 24-V dc transformer, powered by a single 120-V electrical receptacle.
5. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin), with PVC mattress.
6. Hinge: Continuous stainless steel piano hinge.
7. Bed liner dispenser and safety straps are required.

2.3 PUBLIC-USE SHOWER ROOM ACCESSORIES

A. Shower Curtain Rod SCR:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A&J Washroom Accessories
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Accessories
 - d. Bradley Corporation
2. Description: 1-inch- outside diameter, straight rod.
3. Configuration: As indicated on Drawings
4. Mounting Flanges: Exposed fasteners; in material and finish matching rod.
5. Rod Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

B. Shower Curtain SC:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A&J Washroom Accessories
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Accessories
 - d. Bradley Corporation
2. Size: Minimum 12 inches wider than opening by 72 inches high.
3. Material: Vinyl, minimum 0.006 inch thick, opaque, matte.
4. Color: As selected from manufacturer's full range.
5. Grommets: Corrosion resistant at minimum 6 inches o.c. through top hem.
6. Shower Curtain Hooks: Chrome-plated or stainless steel, spring wire curtain hooks with snap fasteners, sized to accommodate specified curtain rod. Provide one hook per curtain grommet.

C. Folding Shower Seat FSS:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A&J Washroom Accessories
 - b. American Specialties, Inc.

- c. Bobrick Washroom Accessories
 - d. Bradley Corporation
 - 2. Configuration: L-shaped seat, designed for wheelchair access.
 - 3. Seat: Phenolic or polymeric composite of slat-type or one-piece construction in color as selected by Architect.
 - 4. Mounting Mechanism: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
- D. Soap Dish SH:
- 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A&J Washroom Accessories
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Accessories
 - d. Bradley Corporation
 - 2. Description: Recessed mounted, with the following features:
 - a. Washcloth bar.
 - 3. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).

2.4 HAND DRYERS

- A. Source Limitations: Obtain hand dryers from single source from single manufacturer.
- B. Warm-Air Dryer <Insert drawing designation>:
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Columbia Vortex
 - b. Dyson Air Blade
 - c. Excel Dryer
 - 2. Description: Standard-speed, warm-air hand dryer.
 - 3. Mounting: Surface mounted.
 - a. Protrusion Limit: Installed unit protrudes maximum 4 inches from wall surface.
 - 4. Operation: Infrared-sensor activated with timed power cut-off switch.
 - a. Automatic Shutoff: At 40 seconds.
 - 5. Maximum Sound Level: 67 dB.
 - 6. Cover Material and Finish: Steel, with enamel finish.
 - 7. Electrical Requirements: 208 to 240 V, 9 to 10 A, 1900 to 2300 W.

2.5 CUSTODIAL ACCESSORIES

A. Custodial Mop and Broom Holder MOP:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. A&J Washroom Accessories
 - b. American Specialties, Inc.
 - c. Bobrick Washroom Accessories
 - d. Bradley Corporation
2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
3. Length: As indicated on drawings..
4. Hooks: Four.
5. Mop/Broom Holders: 4, spring-loaded, rubber hat, cam type.
6. Material and Finish: Stainless steel, ASTM A480/A480M No. 4 finish (satin).
 - a. Shelf: Not less than nominal 0.05-inch- thick stainless steel.
 - b. Rod: Approximately 1/4-inch- diameter stainless steel.

2.6 MATERIALS

- A. Stainless Steel: ASTM A240/A240M or ASTM A666, Type 304, 0.031-inch- minimum nominal thickness unless otherwise indicated.
- B. Steel Sheet: ASTM A1008/A1008M, Designation CS (cold rolled, commercial steel), 0.036-inch- minimum nominal thickness.
- C. Galvanized-Steel Sheet: ASTM A653/A653M, with G60 hot-dip zinc coating.
- D. Fasteners: Screws, bolts, and other devices of same material as accessory unit, unless otherwise recommended by manufacturer or specified in this Section, and tamper and theft resistant where exposed, and of stainless or galvanized steel where concealed.
- E. Mirrors: ASTM C1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.

2.7 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
 - 1. Remove temporary labels and protective coatings.
- B. Grab Bars: Install to comply with specified structural-performance requirements.
- C. Shower Seats: Install to comply with specified structural-performance requirements.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Clean and polish exposed surfaces according to manufacturer's written instructions.

3.3 TOILET ACCESSORY SCHEDULE

- A. Refer to Drawings for Toilet Accessories Legend.
- B. Manufacturer and Model: The following products are supported by the District's standardized purchasing systems. Any alternate accessory type must support the specified systems. Verify all equipment manufacturers are under current District contract.
 - 1. Typical Tissue Dispenser: vonDrehle 3252 Jumbo Roll Twin Jr. roll dispenser
 - 2. Kitchen Bathroom Tissue Dispenser:
 - 3. Soap Dispenser: Spartan 975600 Lite 'n Foamy, white.
 - 4. Napkin Disposal (in all female restrooms and toilet stalls, adult, middle school and high school): Bobrick B-270 Surface-Mounted.
 - 5. Typical Paper Towel Dispenser: Bay West OptiServ Roll Towel Dispenser Model # 86800 Black Translucent.
 - 6. Kitchen Paper Towel Dispenser: Single-roll
 - 7. Electric Hand Dryer (in all group restrooms): Xlerator with noise reducer nozzle or approved equivalent, sensors only, no push-button start.

END OF SECTION 10 28 00

SECTION 10 44 13 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Fire-protection cabinets for the following:
 - a. Portable fire extinguisher.

B. Related Requirements:

- 1. Section 10 44 16 "Fire Extinguishers" for portable, hand-carried fire extinguishers accommodated by fire-protection cabinets

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

- 1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.

B. Shop Drawings: For fire-protection cabinets.

- 1. Include plans, elevations, sections, details, and attachments to other work.

C. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.5 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain fire-protection cabinets, accessories, and fire extinguishers from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

2.3 FIRE-PROTECTION CABINET Insert drawing designation

- A. Cabinet Type: Suitable for fire extinguisher.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Guardian Fire Equipment, Inc.
 - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - c. Larsens Manufacturing Company
 - d. Nystrom, Inc.
 - e. Potter Roemer LLC.
 - f. Oval Fire Products Corporation.
- B. Cabinet Construction: One-hour fire rated.
 - 1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch-thick cold-rolled steel sheet lined with minimum 5/8-inch-thick fire-barrier material. Provide factory-drilled mounting holes.
- C. Cabinet Material: Cold-rolled steel sheet.
 - 1. Shelf: Same metal and finish as cabinet.
- D. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).
 - 1. Square-Edge Trim: 1-1/4- to 1-1/2-inch backbend depth.

2. Rolled-Edge Trim: 2-1/2-inch backbend depth.
- E. Cabinet Trim Material: Steel sheet.
- F. Door Material: Steel sheet.
- G. Door Style: Vertical duo panel with frame.
- H. Door Glazing: Tempered float glass (clear).
- I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.
 1. Provide projecting lever handle with cam-action latch.
 2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.
- J. Accessories:
 1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
 2. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.
 3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.
 - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
 - 1) Location: Applied to cabinet door.
 - 2) Application Process: Silk-screened.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.
- K. Materials:
 1. Aluminum: ASTM B221 for extruded shapes and aluminum sheet, with strength and durability characteristics of not less than Alloy 6063-T5 for aluminum sheet.
 - a. Finish: Color anodic.
 - b. Color: As selected by Design Professional from full range of industry colors and color densities.
 2. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.4 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
 - 1. Weld joints and grind smooth.
 - 2. Miter corners and grind smooth.
 - 3. Provide factory-drilled mounting holes.
 - 4. Prepare doors and frames to receive locks.
 - 5. Install door locks at factory.

- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
 - 1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
 - 2. Fabricate door frames of one-piece construction with edges flanged.
 - 3. Miter and weld perimeter door frames and grind smooth.

- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire-protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for recessed fire-protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

- A. General: Install fire-protection cabinets in locations and at mounting heights indicated
- B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
 - 1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semirecessed fire-protection cabinets.

3.4 ADJUSTING AND CLEANING

- A. Remove temporary protective coverings and strippable films, if any, as fire-protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.
- B. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.
- C. On completion of fire-protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.
- D. Touch up marred finishes, or replace fire-protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire-protection cabinet and mounting bracket manufacturers.
- E. Replace fire-protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 13

SECTION 10 44 16 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.
- B. Related Requirements:
 - 1. Section 10 44 13 "Fire Protection Cabinets."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher and mounting brackets.
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

1.6 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.
 - b. Faulty operation of valves or release levers.
 2. Warranty Period: Six years from date of Material Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
1. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Guardian Fire Equipment, Inc.
 - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - c. Larsens Manufacturing Company
 - d. Nystrom, Inc.
 - e. Potter Roemer LLC.
 - f. Oval Fire Products Corporation.
 2. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
 3. Valves: Manufacturer's standard.
 4. Handles and Levers: Manufacturer's standard.

5. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.

B. Multipurpose Dry-Chemical Type: UL-rated 10 lb nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or black baked-enamel finish.

1. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Design Professional.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

a. Orientation: Vertical.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

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

3.2 INSTALLATION

A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.

B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 10 44 16

SECTION 10 51 13 - METAL LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Welded corridor lockers.
 - 2. Welded athletic lockers.
 - 3. Welded wardrobe lockers.
 - 4. Locker benches.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of metal locker and bench.
- B. Shop Drawings: For metal lockers.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Show locker trim and accessories.
 - 3. Include locker identification system and numbering sequence.
- C. Samples: For each color specified, in manufacturer's standard size.
- D. Product Schedule: For lockers.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. The following metal locker hardware items equal to 10 percent of amount installed for each type and finish installed, but no fewer than five units:
 - a. Locks.
 - b. Blank identification plates.
 - c. Hooks.
 - 2. Provide 1 attic stock door of each color for every 25 lockers.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.

1.9 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of recessed openings by field measurements before fabrication.

1.10 COORDINATION

- A. Coordinate sizes and locations of concrete bases for metal lockers.
- B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Faulty operation of latches and other door hardware.

2. Damage from deliberate destruction and vandalism is excluded.
3. Warranty Period for Welded Metal Lockers: 10 years from date of Material Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain metal lockers, locker benches, and accessories from single source from single locker manufacturer.
 1. Obtain locks from single lock manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: For lockers and locker benches indicated to be accessible, comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design".

2.3 WELDED ATHLETIC LOCKERS

- A. Manufacturers: Subject to compliance with requirements, provide products from one of the following:
 1. Art Metal Products
 2. DeBourgh All Americal Lockers
 3. List Industries, Inc.
 4. Lyon Workspace Products
 5. Penco Products
 6. Republic Storage Products
- B. Perforated Doors: One piece; fabricated from 0.075-inch nominal-thickness steel sheet with manufacturer's standard diamond perforations; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges and latch point (bottom) and right-angle single bend at remaining edges for box lockers.
 1. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
- C. Body: Assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
 1. Tops and Bottoms: 0.060- inch nominal thickness, with single bend at edges.
 2. Backs: 0.048- inch nominal thickness.
 3. Shelves: 0.060- inch nominal thickness, with double bend at front and single bend at sides and back.
 4. Sizes:

- a. LM-1: 24" x 24" x 30" tall (double stacked)
 - b. LM-2, LM-4: 12" x 12" x 30" tall (double stacked)
 - c. LM-3, LM-5: 12" x 12" x 12" tall (five-stacked)
- D. Perforated Sides: Fabricated from 0.060- inch nominal-thickness steel sheet with manufacturer's standard diamond perforations.
- E. Frames: Channel formed; fabricated from 0.060- inch nominal-thickness steel sheet or 0.097- inch nominal-thickness steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
1. Cross Frames for Double-Tier and Triple-Tier Lockers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.
- F. Reinforced Bottoms: Structural channels, formed from 0.060-inch nominal-thickness steel sheet; welded to front and rear of side-panel frames.
- G. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
1. Continuous Hinges: Manufacturer's standard, steel; side or top mounted as required by locker configuration.
- H. Recessed Door Handle and Latch: Stainless -steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.
1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in cylinder locks, or padlocks; positive automatic latching and prelocking.
 - a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 incheshigh with two latch hooks; fabricated from 0.120-inchnominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.
 - b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
- I. Projecting Turn-Handle and Latch: Steel handle welded to manufacturer's standard, three-point, cremone-type latching mechanism consisting of steel rods or bars that engage locker frame at top and bottom of door, and center latch that engages strike jamb; with steel padlock loop.
- J. Door Handle and Latch for Box Lockers: Stainless steel strike plate with integral pull; with steel padlock loop that projects through metal locker door.
- K. Locks: Built-in combination locks.

- L. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.
- M. Hooks: Manufacturer's standard ball-pointed, aluminum or steel; zinc plated.
- N. Continuous Zee Base: 4 inch high; fabricated from 0.075-inch nominal-thickness steel sheet.
- O. Continuous Sloping Tops: Fabricated from 0.048-inch nominal-thickness steel sheet, with a pitch of approximately 20 degrees.
 - 1. Closures: Vertical -end type.
- P. Recess Trim: Fabricated from 0.048-inch nominal-thickness steel sheet.
- Q. Filler Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.
- R. Boxed End Panels: Fabricated from 0.060-inch nominal-thickness steel sheet.
- S. Materials:
 - 1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
- T. Finish: Powder coat.
 - 1. Color: As selected by Design Professional from manufacturer's full range.

2.4 WELDED WARDROBE LOCKERS

- A. Manufacturers: Subject to compliance with requirements, provide products from one of the following:
 - 1. Art Metal Products
 - 2. DeBourgh All Americal Lockers
 - 3. List Industries, Inc.
 - 4. Lyon Workspace Products
 - 5. Penco Products
 - 6. Republic Storage Products
- B. Body: Two Person Metal Z Locker assembled by welding body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
 - 1. Tops and Bottoms: 0.060-inch nominal thickness, with single bend at edges.
 - 2. Backs: 0.048-inch nominal thickness.
 - 3. Shelves: 0.060-inch nominal thickness, with double bend at front and single bend at sides and back.
 - 4. Size:
 - a. LM-Z: 18" x 21" x 72" tall, two person per unit.

- C. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet or 0.105-inch nominal-thickness steel angles; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames.
- D. Reinforced Bottoms: Structural channels, formed from 0.075-inch nominal-thickness steel sheet; welded to front and rear of side-panel frames.
- E. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
 - 1. Continuous Hinges: Manufacturer's standard, steel, full height.
- F. Recessed Door Handle and Latch: Stainless steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.
 - 1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks or padlocks; positive automatic latching and prelocking.
 - a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 inches high with two latch hooks; fabricated from 0.120- inch nominal-thickness steel sheet; welded to full-height door strikes; with resilient silencer on each latch hook.
 - b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact, and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
- G. Locks: Built-in combination locks.
- H. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.
- I. Hooks: Manufacturer's standard ball-pointed, aluminum or steel; zinc plated.
- J. Coat Rods: 1-inch- diameter steel, nickel plated.
- K. Continuous Sloping Tops: Fabricated from 0.048-inch nominal-thickness steel sheet, with a pitch of approximately 20 degrees.
 - 1. Closures: Vertical -end type.
- L. Filler Panels: Fabricated from 0.048-inch nominal-thickness steel sheet.
- M. Boxed End Panels: Fabricated from 0.060-inch nominal-thickness steel sheet.
- N. Materials:
 - 1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.

O. Finish: Powder coat.

1. Color: As selected by Design Professional from manufacturer's full range.

2.5 LOCKS

A. Built-in Combination Lock: Key-controlled, three-number dialing combination locks; capable of at least five combination changes made automatically with a control key.

1. Bolt Operation: automatically locking spring bolt.

2.6 LOCKER BENCHES

A. Manufacturers: Subject to compliance with requirements, provide products from one of the following:

1. Art Metal Products
2. DeBourgh All Americal Lockers
3. List Industries, Inc.
4. Lyon Workspace Products
5. Penco Products
6. Republic Storage Products
7. Scranton Tufftec Bench by Scranton Products

B. Provide bench units with overall assembly height of 17-1/2 inches.

C. Bench Tops: Manufacturer's standard one-piece units, with rounded corners and edges.

D. Fixed-Bench Pedestals: Manufacturer's standard supports, with predrilled fastener holes for attaching bench top and anchoring to floor, complete with fasteners and anchors, and as follows:

1. Color: As selected by Design Professional from manufacturer's full range.

E. Materials:

1. Extruded Aluminum: ASTM B221, alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated.
2. Steel Tube: ASTM A500/A500M, cold rolled.
3. Solid HDPE (benches only) complying with ASTM D 4976.

F. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.

1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.

- G. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.
- H. Equipment: Provide each locker with an identification plate and the following equipment:
1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
 2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
 3. Triple-Tier Units: One double-prong ceiling hook.
- I. Welded Construction: Factory preassemble metal lockers by welding all joints, seams, and connections; with no bolts, nuts, screws, or rivets used in assembly of main locker groups. Factory weld main locker groups into one-piece structures. Grind exposed welds smooth and flush.
- J. Accessible Lockers: Fabricate as follows:
1. Locate bottom shelf no lower than 15 inches above the floor.
 2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.
- K. Continuous Zee Base: Fabricated in lengths as long as practical to enclose base and base ends; finished to match lockers.
- L. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.
1. Sloping-top corner fillers, mitered.
- M. Individual Sloping Tops: Fabricated in width to fit one locker frame in lieu of flat locker tops; with integral back; finished to match lockers. Provide wedge-shaped divider panels between lockers.
- N. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.
- O. Boxed End Panels: Fabricated with 1-inch-wide edge dimension, and designed for concealing fasteners and holes at exposed ends of nonrecessed metal lockers; finished to match lockers.
1. Provide one-piece panels for double-row (back-to-back) locker ends.
- P. Finished End Panels: Fabricated to conceal unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
1. Provide one-piece panels for double-row (back-to-back) locker ends.

2.7 ACCESSORIES

- A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.
- B. Anchors: Material, type, and size required for secure anchorage to each substrate.
 - 1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls for corrosion resistance.
 - 2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and floors or support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install lockers level, plumb, and true; shim as required, using concealed shims.
 - 1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
 - 2. Anchor single rows of metal lockers to walls near top and bottom of lockers.
 - 3. Anchor back-to-back metal lockers to floor.
- B. Welded Lockers: Connect groups together with manufacturer's standard fasteners, with no exposed fasteners on face frames.
- C. Equipment:
 - 1. Attach hooks with at least two fasteners.
 - 2. Attach door locks on doors using security-type fasteners.
 - 3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
 - a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
 - b. Attach plates to upper shelf of each open-front metal locker, centered, with a least two aluminum rivets.

- D. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
 - 1. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
 - 2. Attach sloping-top units to metal lockers, with closures at exposed ends.

3.3 ADJUSTING

- A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding. Verify that integral locking devices operate properly.

3.4 PROTECTION

- A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.
- B. Touch up marred finishes, or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 10 51 13

SECTION 10 56 16 - UTILITY SHELVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: Prefabricated wood storage shelving.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design wood storage shelving, eight feet or greater in height, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Seismic Performance: Wood storage shelving eight feet or greater in height shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. Seismic Component Importance Factor: As indicated on Structural Drawings.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, construction details, material descriptions, dimensions of individual components and profiles, and finishes for fabricated wood storage shelving.
- B. Shop Drawings: For fabricated wood storage shelving. Include plans, elevations, sections, details, and attachments to other work. Include installation details of connectors, lateral bracing, and special bracing.
- C. Product Schedule: For fabricated wood storage shelving. Use same designations indicated on Drawings.
- D. Manufacturer's installation instructions.
- E. Delegated Design Submittal: For fully loaded fabricated wood storage shelving systems eight feet or greater in height indicated to comply with performance criteria and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 1. Include design calculations.

- F. Seismic Qualification Certificates: For fabricated wood storage shelving, accessories, and components, from manufacturer.

1.5 QUALITY ASSURANCE

- A. Manufacturer: Company specializing in manufacturing of storage shelving components with five years experience.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install fabricated wood storage shelving until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Do not store units on project site.
- C. Protect finished surfaces from soiling and damage during handling and installation.
- D. Field Measurements: Verify actual dimensions of construction contiguous with fabricated wood storage shelving by field measurements before fabrication.

1.7 COORDINATION

- A. Coordinate sizes and locations of blocking and backing required for installation of fabricated wood storage shelving attached to wall and ceiling assemblies.
- B. Coordinate locations and installation of fabricated wood storage shelving that may interfere with ceiling systems including lighting, HVAC, speakers, sprinklers, access panels, electrical switches or outlets, and floor drains.

PART 2 - PRODUCTS

2.1 MANUFACTURERS/SUPPLIERS

- A. Subject to compliance with requirements, provide products by one of the following:
1. Excalibur. (Basis of Design)
 2. Lundia.
 3. Newood Display Fixtures Mfg. Co.
 4. Palmetto Shelving Systems, Inc.; White Rock, SC.
 5. Shelving Exchange, Inc.; Houston, TX.

2.2 WOOD SHELVING COMPONENTS

- A. General: Provide: 10 units (3'-0"wd x 1'-6"x 6'-0" ht); and 5 units (2'-0"wd x 1'-6"x 6'-0" ht). Verify placement locations with Owner.
- B. Uprights: Spruce or Douglas fir, 1-5/8" x 1-1/4".
1. 3/8" x 5/8" deep plow entire length of stiles to receive shelf end channels with 3/16" drilled holes on 2" centers. Uprights to be sufficient height for shelving to be 7'-0" high.
 2. Stiles are to be locked together with three or more cross members mortised, glued and pinned into the stiles.
 3. All components are to be machined smooth with all outside corners eased.
- C. Shelves: Pine, No. 2 grade.
1. 3/4" pine shelf materials are to be machined to accept roll formed steel end channels shaped to fit over each end of the shelf and to rest on the shelf support pins. No finger joints allowed.
 - a. Provide [seven (7)] [number] of shelves per unit [as indicated].
- D. Shelf Support Pins: Non rusting alloy, 3/16" diameter x 1-1/4" long, 5/16" diameter head.
- E. "X" Braces: Two 16 gage galvanized 5/8" steel straps with holes punched at each end. Rivet straps at centers. One "X" brace required every 3 sections.
- F. Backs: 1/8" Abitibi S2S tempered hardboard.
1. All back-to-back units to have back panels.
- G. Kickboard: Provide 4" pine kickboard for each unit.
- H. Finish: Seal and lacquer standard finish by manufacturer.
- I. Required Signage: Provide plastic or metal signage stating "NO STORAGE IS ALLOWED ON THE TOP SHELF."

2.3 FABRICATION OF WOOD SHELVING

- A. Manufacture shelving in sizes as necessary to fit wall-to-wall and as indicated on drawings. Gaps in excess of 2" are not acceptable.
- B. Where drawings may indicate dead corners, fabricate shelving to fill corners.
- C. Shelves shall not exceed 42" in length in general storage areas and 36" in book storage rooms. Shelves less than 3/4" thick must be preapproved (sample required) and may not exceed 30" in length.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that building conditions are ready to receive storage shelving, including blocking in walls, as necessary to secure shelving units.
- B. Beginning of installation means acceptance of existing conditions.

3.2 INSTALLATION

- A. Install fabricated wood storage shelving in accordance with manufacturer's written instructions and approved shop drawings, level, plumb, square, rigid, true, and with shelves flat and free of dents or distortion. Make connections to form a rigid structure, free of buckling and warping.
- B. Provide firm anchorage to adjacent wall or ceiling construction, as appropriate.

3.3 ADJUSTING

- A. Adjust fabricated wood storage shelving so that connectors and other components engage accurately and securely.
- B. Adjust and lubricate operable components to operate smoothly and easily, without binding or warping. Check and readjust operating hardware.
- C. Touch up marred finishes or replace fabricated wood storage shelving that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fabricated wood storage shelving manufacturer.
- D. Replace fabricated wood storage shelving that has been damaged or has deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 105616

SECTION 10 73 00 - ALUMINUM WALKWAY COVERS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Design, fabrication, and installation of welded extruded aluminum walkway cover systems.
- B. Products Furnished but not Installed Under this Section: Column sleeves (styrofoam blockouts) or anchor bolts (if required)

1.2 REFERENCES

- A. The Aluminum Association (AA):
 - 1. The Aluminum Design Manual 2000, Specifications & Guidelines for Aluminum Structures.
- B. American Architectural Manufacturers Association (AAMA):
 - 1. AAMA 611, Voluntary Specification for Anodized Architectural Aluminum.
 - 2. AAMA 2603, Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Aluminum Extrusions and Panels.
 - 3. AAMA 2605, Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels.
- C. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7, Minimum Design Loads for Buildings and Other Structures.
- D. American Society for Testing and Materials (ASTM):
 - 1. ASTM B 209, Specification for Aluminum and Aluminum- Alloy Sheet and Plate.
 - 2. ASTM B 221, Specification for Aluminum and Aluminum- Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 3. ASTM C 150, Specification for Portland Cement.
 - 4. ASTM C 404, Specification for Aggregates for Masonry Grout.
- E. American Welding Society (AWS):
 - 1. ANSI/AWS D1.2, Structural Welding Code - Aluminum.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements:
 - 1. The extent of aluminum walkway covers shall be as indicated on the drawings.

2. Design Walkways in accordance with The Aluminum Design Manual 2000.
3. Comply with the wind requirements of ASCE 7.
4. Provide an all welded extruded aluminum system complete with internal drainage. Non-welded systems are not acceptable. Roll formed deck is not acceptable.
5. Provide expansion joints to accommodate temperature changes of 120 degrees F.
6. Provide expansion joints with no metal to metal contact.

B. Performance Requirements:

1. Comply with the structural requirements indicated on the drawings.
2. Grout: Compressive strength of 2000 psi, minimum.

C. Fabrication Criteria:

1. Provide protective covers produced by manufacturer regularly engaged in fabrication and erection of the type and quality indicated.
2. Design sizes of prefabricated components and necessary field connections required for erection to permit easy assembly and disassembly.

1.4 SUBMITTALS

- A. Product Data: Manufacturer's product information, specifications, and installation instructions for walkway cover components and accessories.
- B. Shop Drawings: Submit complete erection drawings showing anchor bolts settings, roof framing, transverse cross sections, covering and trim details, and accessory installation details to clearly indicated proper assembly of components.
- C. Samples:
1. Selection: Manufacturer's standard range of colors for the finishes and textures selected.
 2. Verification: 2-inch-square samples of each finish selected on the substrate specified.
- D. Design Data: Design calculations bearing the seal of a Registered Professional Engineer, licensed in the state where the project is located. Design calculations shall state that the walkway cover system design complies with the wind requirements of ASCE 7, the stability criteria of applicable building code, and all other governing criteria.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: At least ten years of experience in the design, fabrication, and erection of extruded aluminum walkway cover systems.
- B. Installer Qualifications: Have walkway covers installed by manufacturer, third party installation is not acceptable.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver and store prefabricated components, sheets, panels, and other manufactured items so they will not be damaged or deformed.

- B. Stack materials on platforms or pallets, covered with tarpaulins or other suitable weathertight ventilated covering.
 - 1. Store metal sheets or panels so that water accumulations will drain freely.
 - 2. Do not store sheets or panels in contact with other materials which might cause staining.

1.6 WARRANTY

- A. Manufacturer's Product Warranty:
 - 1. Manufacturer guarantee panels for five (5) years against panel rupture, structural failure or perforation due to corrosion.
 - 2. Provide paint manufacturers one (1) year guarantee against fading, cracking, peeling, blistering or wear-thru of paint film

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products from one of the following:
 - 1. AVAdeck / Air-Vent
 - 2. Coastal Canvas Products
 - 3. Dittmer Architectural Aluminum
 - 4. Mapes Architectural Canopies
 - 5. Mitchell Metals
 - 6. Peachtree Protective Covers
 - 7. Perfection Architectural Systems
 - 8. Superior Mason Products
 - 9. Tennessee Valley Metals

2.2 MATERIALS

- A. Aluminum Members: Extruded aluminum, ASTM B 221, 6063 alloy, T6 temper.
- B. Fasteners: Aluminum, 18-8 stainless steel, or 300 series stainless steel.
- C. Protective Coating for Aluminum Columns Embedded in Concrete: Clear acrylic.
- D. Grout:
 - 1. Portland Cement: ASTM C 150, Type I.
 - 2. Sand: ASTM C 404.
 - 3. Water: Potable.
- E. Gaskets: Dry seal santoprene pressure type.
- F. Aluminum Flashing: ASTM B 209, Type 3003 H14, 0.040 inch, minimum.

- G. Sealants: Refer to section 07 92 00 – JOINT SEALANTS.

2.3 MIXES

- A. Grout: 1 part portland cement to 3 parts sand, add water to produce a pouring consistency.

2.4 FABRICATION

- A. General:

1. Shop Assembly: Assemble components in shop to greatest extent possible to minimize field assembly.
 2. Welding: In accordance with ANSI/AWS D1.2.
 3. Bent Construction: Factory assemble beams to columns to form one-piece rigid bents. Where used make welds smooth and uniform using an inert gas shielded arc. Perform suitable edge preparation to assure 100% penetration. Grind welds only where interfering with adjoining structure to allow for flush connection. Field welding is not permitted. Rigid mechanical joints can be used if supported by engineering calculations and/or testing.
 4. Deck Construction: Fabricate from extruded modules that interlock in a self-flashing manner. Positively fasten interlocking joints creating a monolithic structural unit capable of developing the full strength of the sections. The fastenings must have minimum shear strength of 350 pounds each. Assemble deck with sufficient camber to offset dead load deflection.
- B. Columns: Provide radius-cornered tubular extrusions with cutout and internal diverter for drainage where indicated. Circular downspout opening in column not acceptable.
- C. Beams: Provide open-top tubular extrusion, top edges thickened for strength and designed to receive deck members in self-flashing manner.
- A. Deck: Extruded self-flashing sections interlocking into a composite unit. Provide welded plate closures at deck ends.
- E. Fascia: Manufacturer's standard shape. Provide fascia splices where continuous runs of fascia are jointed. Locate splices to be in line with bents and fasten in place on hidden or non-vertical surfaces.
- F. Provide weather seal where required to other construction with flashings that meet the design intent as detailed on the Construction Drawings.
- G. Factory Finishing: Finish designations prefixed by AA comply with system established by the AAMA for designating aluminum finishes.
1. Roof Decking: Baked-Enamel Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: Thermosetting, modified-acrylic enamel primer/topcoat system, except with a minimum dry film thickness of 1.5 mils (0.04 mm), medium gloss), complying with AAMA 2603. Apply baked enamel complying with paint manufacturer's specifications for cleaning, conversion coating, and painting. Color shall be white.

2. Fascia: Class 1 Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated), complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Verify that all concrete, masonry, and roofing work in the vicinity is complete and cleaned.

3.2 ERECTION

- A. Erect protective cover true to line, level, and plumb. Protect aluminum columns embedded in concrete with clear acrylic. Fill downspout columns with grout to the discharge level to prevent standing water. Install weep holes at top of concrete in non-draining columns to remove condensation.
- B. Provide hairline miters and fitted joints.

3.3 CLEANING

- A. Clean all protective cover components promptly after installation.
- B. Remove excess sealant compounds, dirt, and other substances from aluminum surfaces.

3.4 PROTECTION

- A. Institute protective measures and other precautions required to assure aluminum walkway covers are without damage or deterioration, other than normal weathering, at time of Final Acceptance.

END OF SECTION 10 73 00

SECTION 10 73 13 - AWNINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Fixed awnings.

1.3 ACTION SUBMITTALS

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

- 1. Include styles, material descriptions, construction details, fabrication details, dimensions of individual components and profiles, hardware, fittings, mounting accessories, features, and finishes for awnings.
 - 2. Include rated capacities, operating characteristics and furnished specialties and accessories.

- B. Shop Drawings:

- 1. Include plans, elevations, sections, mounting heights, and attachment details.
 - 2. Detail fabrication and assembly of awnings.
 - 3. Show locations for blocking, reinforcement, and supplementary structural support.

- C. Samples for Initial Selection: For each type of exposed finish.

- D. Product Schedule: For awnings. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

- B. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For awnings to include in operation and maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.
- B. Installer Qualifications: Fabricator of products.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.7 WARRANTY

- A. Special Warranty: Manufacturer and fabricator agree to repair or replace components of awnings that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including framework.
 - b. Deterioration of fabric including seam failure.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Faulty operation of operator.
 - 2. Manufacturer guarantee panels for five (5) years against panel rupture, structural failure or perforation due to corrosion.
 - 3. Provide paint manufacturers one (1) year guarantee against fading, cracking, peeling, blistering or wear-thru of paint film.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 FIXED AWNING FABRICATION

- A. Manufacturers: Subject to compliance with requirements, provide products from one of the following:
1. AVAdeck / Air-Vent
 2. Dittmer Architectural Aluminum
 3. Mapes Architectural Canopies
 4. Mitchell Metals
 5. Peachtree Protective Covers
 6. Perfection Architectural Systems
 7. Tennessee Valley Metals
- B. Frame Fabrication: Fabricate awning frames from aluminum. Preassemble in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- C. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- D. Weld corners and connections continuously. Obtain fusion without undercut or overlap. Remove welding flux immediately. At exposed corners and connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- E. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure awnings in place and to properly transfer loads.
- F. Aluminum Finish: Baked-enamel or powder-coat finish complying with finish manufacturer's written instructions for surface preparation including pretreatment, application, baking, and minimum dry film thickness.
1. Color: As selected by Design Professional from manufacturer's full range.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for supporting members, blocking, inserts, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install awnings at locations and in position indicated, securely connected to supports, free of rack, and in proper relation to adjacent construction. Use mounting methods of types described and in compliance with Shop Drawings and fabricator's written instructions.
- B. Install awnings after other finishing operations, including joint sealing and painting, have been completed.
- C. Weld frame connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
 - 1. Field Welding: Comply with the following requirements:
 - a. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - b. Obtain fusion without undercut or overlap.
 - c. Remove welding flux immediately.
 - d. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Anchoring to In-Place Construction: Use anchors, fasteners, fittings, hardware, and installation accessories where necessary for securing awnings to structural support and for properly transferring load to in-place construction.
- E. Corrosion Protection: Coat concealed surfaces of aluminum that come in contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.
- F. Coordinate awning installation with flashing and joint-sealant installation so these materials are installed in sequence and in a manner that prevents exterior moisture from passing through completed exterior wall and roof assemblies.

3.3 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly, and lubricate as recommended by retractable-awning manufacturer.

3.4 CLEANING AND PROTECTION

- A. Touch up factory-applied finishes to restore damaged or soiled areas.

END OF SECTION 10 73 13

SECTION 10 75 16 - GROUND-SET FLAGPOLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes ground-set flagpoles made from aluminum.
- B. Owner-Furnished Material: Flags.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, operating characteristics, fittings, accessories, and finishes for flagpoles.
- B. Shop Drawings: For flagpoles.
 - 1. Include plans, elevations, and attachment details. Show general arrangement, jointing, fittings, accessories, grounding, anchoring, and support.
 - 2. Include section, and details of foundation system.
- C. Delegated-Design Submittal: For flagpoles.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For flagpoles to include in operation and maintenance manuals.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Spiral wrap flagpoles with heavy paper and enclose in a hard fiber tube or other protective container.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain flagpoles as complete units, including fittings, accessories, bases, and anchorage devices, from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design flagpole assemblies.

2.3 ALUMINUM FLAGPOLES

- A. Aluminum Flagpoles: Cone -tapered flagpoles fabricated from seamless extruded tubing complying with ASTM B241/B241M, Alloy 6063, with a minimum wall thickness of 3/16 inch.

1. Manufacturers: Subject to compliance with requirements, provide products from one of the following:

- a. Acme Lingo Flagpoles
- b. Baartol Company, Inc.
- c. Concord American Flagpole
- d. Eder Flag Manufacturing Company, Inc.
- e. Morgan-Francis Flagpoles & Accessories
- f. Pole-Tech Company, Inc.

- B. Exposed Height: (2) 30 foot (1) 40 foot.

- C. Construct flagpoles in one piece if possible. If more than one piece is necessary, comply with the following:

1. Fabricate shop and field joints without using fasteners, screw collars, or lead calking.
2. Provide flush hairline joints using self-aligning, snug-fitting, internal sleeves.

- D. Metal Foundation Tube: Manufacturer's standard corrugated-steel foundation tube, 0.060-inch wall thickness with 3/16-inch steel bottom plate and support plate; 3/4-inch- diameter, steel ground spike; and steel centering wedges welded together. Galvanize foundation tube after assembly. Furnish loose hardwood wedges at top of foundation tube for plumbing pole.

1. Flashing Collar: Same material and finish as flagpole.

- E. Cast-Metal Shoe Base: Made from aluminum with same finish and color as flagpoles for anchor-bolt mounting; furnish with anchor bolts.

1. Furnish ground spike.

2.4 FITTINGS

- A. Finial Ball: Flush-seam ball, sized as indicated or, if not indicated, to match flagpole-butt diameter.
 - 1. Spun stainless steel, finished to match flagpole.
- B. Internal Halyard, Cam Cleat System: 5/16-inch-diameter, braided polypropylene halyard; cam cleat; and concealed revolving truck assembly with plastic-coated counterweight and sling. Furnish flush access door secured with cylinder lock. Finish truck assembly to match flagpole.
 - 1. Halyard Flag Snaps: Chromium-plated bronze swivel snap hooks. Furnish two per halyard.

2.5 MISCELLANEOUS MATERIALS

- A. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M.
- B. Drainage Material: Crushed stone, or crushed or uncrushed gravel; coarse aggregate.
- C. Sand: ASTM C33/C33M, fine aggregate.
- D. Elastomeric Joint Sealant: Single-component neutral-curing silicone joint sealant complying with requirements in Section 07 92 00 "Joint Sealants."

2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Prepare uncoated metal flagpoles that are set in foundation tubes by painting below-grade portions with a heavy coat of bituminous paint.
- B. Foundation Excavation: Excavate to neat clean lines in undisturbed soil. Remove loose soil and foreign matter from excavation and moisten earth before placing concrete. Place and compact drainage material at excavation bottom.
- C. Provide forms where required due to unstable soil conditions and for perimeter of flagpole base at grade. Secure and brace forms to prevent displacement during concreting.
- D. Foundation Tube: Place foundation tube, center, and brace to prevent displacement during concreting. Place concrete. Plumb and level foundation tube and allow concrete to cure.

- E. Anchor Bolts: Locate and secure anchor bolts in forms with templates and by tying to reinforcement.
- F. Place concrete, as specified in Section 03 30 00 "Cast-in-Place Concrete." Compact concrete in place by using vibrators. Moist-cure exposed concrete for no fewer than seven days or use nonstaining curing compound.
- G. Trowel exposed concrete surfaces to a smooth, dense finish, free of trowel marks, and uniform in texture and appearance. Provide positive slope for water runoff to perimeter of concrete base.

3.2 FLAGPOLE INSTALLATION

- A. General: Install flagpoles where indicated and according to Shop Drawings and manufacturer's written instructions.

END OF SECTION 10 75 16