# ST. TERESA 0F CALCUTTA CATHOLIC CHURCH

**FORT WORTH, TEXAS**

# PARISH HALL

## PROJECT MANUAL - Volume 1

ISSUE DATE: AUGUST 5, 2024

ARCHITECTURE
Scott Martsolf, Architect
815 West Daggett Ave.
Fort Worth, Texas 76104

STRUCTURAL
HnH Engineering Inc.
105 Sproles Drive
Benbrook, Texas 76126

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# VOLUME 1

# SECTION 00100

# BID SOLICITATION

**DATE:** **August 5, 2024**

**FROM:**

**THE OWNER (HEREINAFTER REFERRED TO AS OWNER):**

**Owner:** **Michael F. Olson S.T.D, Bishop of the Catholic Diocese of Fort Worth**

**800 West Loop 820 South**
**Fort Worth, Texas 76108**

ST. TERESA CATHOLIC CHURCH
13517 ALTA VISTA ROAD
FORT WORTH, TEXAS 76262

**AND THE ARCHITECT (HEREINAFTER REFERRED TO AS ARCHITECT):**

SCOTT MARTSOLF- ARCHITECT
815 WEST DAGGETT AVENUE
FORT WORTH, TEXAS 76104

**TO:**

**POTENTIAL BIDDERS**

A. Your company is invited to submit an offer to the Owner for the construction of the proposed PARISH HALL WITH SITEWORK, 13517 ALTA VISTA ROAD, FORT WORTH, 76262, before 4**:00 pm local standard time, THURSDAY, AUGUST 29, 2024.** Bids will be received by e-mail :**scott@marstolfarch.com**

B. The Owner reserves the right to accept or reject any or all offers.

C. Architect to submit Construction Documents to the City of Fort Worth to begin permitting process. Selected General Contractor to finalize the Permit process, fees are reimbursable expenses paid by the Owner.

**END OF BID SOLICITATION – 00100**

# INFORMATION AVAILABLE TO BIDDERS

## EXISTING REPORTS AND SURVEYS

### 1.01 SUBSURFACE INVESTIGATION REPORT

A. A geotechnical report with respect to the building site has been completed. The results follow this section.

B. This report will identify properties of below grade conditions and offers recommendations

C. The recommendations shall not be construed as a requirement of this Contract, unless specifically referenced in the Contract Documents.

D. This report, by its nature, cannot reveal all conditions that exist on the site. Should subsurface conditions be found to vary substantially from this report, changes in the design and construction of foundations will be made, with resulting credits or expenditures to the Contract Price accruing to Owner.

**END OF INFORMATION AVAILABLE TO BIDDERS**

# GEOTECHNICAL ENGINEERING STUDY
# ST. TERESA OF CALCUTTA
# 13717 ALTA VISTA ROAD
# FORT WORTH, TEXAS

Presented To:

**Catholic Diocese of Fort Worth**

June 2024

**PROJECT NO. 398-24-24**

CMJ Engineering

June 21, 2024
Report No. 398-24-24

Catholic Diocese of Fort Worth
800 West Loop 820 South
Fort Worth, Texas 76108

Attn: Mr. John Jackson, Senior Project Manager

**GEOTECHNICAL ENGINEERING STUDY**
**ST. TERESA OF CALCUTTA**
**13717 ALTA VISTA ROAD**
**FORT WORTH, TEXAS**

Dear Mr. Jackson:

Submitted here are the results of a geotechnical engineering study for the referenced project. This study was performed in general accordance with our Proposal No. 23-9248 dated August 13, 2023. The geotechnical services were authorized on January 12, 2024 by Michael F. Olson, STD, Bishop of Catholic Diocese of Fort Worth.

Engineering analyses and recommendations are contained in the text section of the report. Results of our field and laboratory services are included in the appendix of the report. We would appreciate the opportunity to be considered for providing the materials engineering and geotechnical observation services during the construction phase of this project.

We appreciate the opportunity to be of service to the Catholic Diocese of Fort Worth and their consultants. Please contact us if you have any questions or if we may be of further service at this time.

Respectfully submitted,
**CMJ ENGINEERING, INC.**
TEXAS FIRM REGISTRATION NO. F-9177

Daniel R. Green, Ph.D., E.I.T.
Graduate Engineer
Texas No. 54428

STATE OF TEXAS
JAMES P. SAPPINGTON, IV
97402
LICENSED PROFESSIONAL ENGINEER
6-21-24

James P. Sappington IV, P.E
President
Texas No. 97402

copies submitted: (2) Mr. John Jackson; Catholic Diocese of Fort Worth (email & mail)

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## APPENDIX A

# 1.0 INTRODUCTION

## 1.1 Project Description

The project, as currently planned, consists of a new church campus located at 13717 Alta Vista Road in Fort Worth, Texas. Overall, approximately, 102,000 square feet of new building footprint is planned, comprising the following buildings: 2,500-seat Church with Narthex, Parish Hall, Chapel, Pastoral Center, and Formation Building. The Formation Building will be two stories. Extensive area parking and driveways are planned, and a detention pond will be located in the southwestern portion of the site, where a pond presently exists. Plate A.1, Plan of Borings, presents the approximate locations of the exploration borings.

## 1.2 Purpose and Scope

The purpose of this geotechnical engineering study has been to determine the general subsurface conditions, evaluate the engineering characteristics of the subsurface materials encountered, and develop recommendations for the type or types of foundations suitable for the project.

To accomplish its intended purposes, the study has been conducted in the following phases: (1) drilling sample borings to determine the general subsurface conditions and to obtain samples for testing; (2) performing laboratory tests on appropriate samples to determine pertinent engineering properties of the subsurface materials; and (3) performing engineering analyses, using the field and laboratory data to develop geotechnical recommendations for the proposed construction.

The design is currently in progress and the locations and/or elevations of the structures could change. Once the final design is near completion (80-percent to 90-percent stage), it is recommended that CMJ Engineering, Inc. be retained to review those portions of the construction documents pertaining to the geotechnical recommendations, as a means to determine that our recommendations have been interpreted as intended.

## 1.3 Report Format

The text of the report is contained in Sections 1 through 11. All plates and large tables are contained in Appendix A. The alpha-numeric plate and table numbers identify the appendix in which they appear. Small tables of less than one page in length may appear in the body of the text and are numbered according to the section in which they occur.

Units used in the report are based on the English system and may include tons per square foot (tsf), kips (1 kip = 1,000 pounds), kips per square foot (ksf), pounds per square foot (psf), pounds per cubic foot (pcf), and pounds per square inch (psi).

## 2.0 FIELD EXPLORATION AND LABORATORY TESTING

### 2.1 Field Exploration

Subsurface materials at the project site were explored by twenty (20) vertical soil borings. Borings B-1 through B-15 are associated with the proposed buildings and were extended to depths of 25 to 30 feet. Borings B-16 through B-20 are associated with area paving and were extended to a depth of 5 feet. The borings were drilled using continuous flight augers at the approximate locations shown on the Plan of Borings, Plate A.1. The boring logs are included on Plates A.4 through A.23 and keys to classifications and symbols used on the logs are provided on Plates A.2 and A.3.

Undisturbed samples of cohesive soils were obtained with nominal 3-inch diameter thin-walled (Shelby) tube samplers at the locations shown on the logs of borings. The Shelby tube sampler consists of a thin-walled steel tube with a sharp cutting edge connected to a head equipped with a ball valve threaded for rod connection. The tube is pushed into the soil by the hydraulic pulldown of the drilling rig. The soil specimens were extruded from the tube in the field, logged, tested for consistency with a hand penetrometer, sealed, and packaged to limit loss of moisture.

The consistency of cohesive soil samples was evaluated in the field using a calibrated hand penetrometer. In this test a 0.25-inch diameter piston is pushed into the relatively undisturbed sample at a constant rate to a depth of 0.25 inch. The results of these tests, in tsf, are tabulated at respective sample depths on the logs. When the capacity of the penetrometer is exceeded, the value is tabulated as 4.5+.

To evaluate the relative density and consistency of the harder formations, a modified version of the Texas Cone Penetration test was performed at selected locations. Texas Department of Transportation (TxDOT) Test Method Tex-132-E specifies driving a 3-inch diameter cone with a 170-pound hammer freely falling 24 inches. This results in 340 foot-pounds of energy for each blow. This method was modified by utilizing a 140-pound hammer freely falling 30 inches. This results in 350 foot-pounds of energy for each hammer blow. In relatively soft materials, the penetrometer cone is driven 1 foot and the number of blows required for each 6-inch penetration is tabulated at

respective test depths, as blows per 6 inches on the log. In hard materials (rock or rock-like), the penetrometer cone is driven with the resulting penetrations, in inches, recorded for the first and second 50 blows, a total of 100 blows. The penetration for the total 100 blows is recorded at the respective testing depths on the boring logs.

### 2.2 Laboratory Testing

Laboratory soil tests were performed on selected representative samples recovered from the borings. In addition to the classification tests (liquid limits and plastic limits), moisture content, unit weight, and unconfined compressive strength tests were performed. Results of the laboratory classification tests, moisture content, unit weight, and unconfined compressive strength tests conducted for this project are included on the boring logs.

Swell tests were performed on specimens from selected samples of the clays. These tests were performed to help in evaluating the swell potential of soils in the area of the proposed structures. The results of the swell tests are presented on Plate A.24.

Soluble sulfate tests were conducted on selected soil samples. The sulfate testing was conducted to help identify lime-induced heaving potential of the soils. The results of these tests are presented on Plate A.25.

The above laboratory tests were performed in general accordance with applicable ASTM procedures, or generally accepted practice.

## 3.0 SUBSURFACE CONDITIONS

### 3.1 Soil Conditions

Specific types and depths of subsurface strata encountered at the boring locations are shown on the boring logs in Appendix A. The generalized subsurface stratigraphy encountered in the borings is discussed below. Note that depths on the borings refer to the depth from the existing grade or ground surface present at the time of the investigation, and the boundaries between the various soil types are approximate.

Soils encountered in the borings consist of dark brown, brown, light brown, light reddish brown, and gray clays, silty clays, shaly clays, and silty shaly clays. The clayey soils contain ironstone nodules, calcareous nodules, and limestone fragments, and occasionally contain iron stains, iron seams, calcareous deposits, gypsum crystal deposits, and gravel. Weathered limestone seams are noted within the shaly clays and silty clays in Borings B-7 and B-8 below depths of 2 to 7 feet. Fractured tan limestone seams are noted within the clays in Boring B-12 above a depth of 3 feet. In addition, tan fractured limestone layers with thicknesses of 1 to 2 feet are present within the surficial clays in Borings B-11, B-14, and B-19 at depths of 1 to 3 feet.

The various clays encountered in the borings had Liquid Limits (LL) ranging from 37 to 80 with Plasticity Indices (PI) ranging from 21 to 60, and classify as CL and CH by the USCS. The clayey soils are generally firm to hard (soil basis) in consistency with pocket penetrometer readings of 1.25 to over 4.5 tsf. Soft soils were present in Borings B-2, B-3, B-10, and B-16 from depths of 1 to 4 feet with pocket penetrometer readings of 0.75 to 1.0 tsf. Tested unit weight values varied from 89 to 112 pcf and tested unconfined compressive strength values were 1,140 to 12,100 psf. Select lower strength tests and pocket penetrometer readings reflect appreciable limestone fragments or slickensided characteristics, indicating higher in-situ strengths than the tested values.

Tan limestone with occasional clay seams and layers was next encountered in Borings B-1 through B-5, B-7 through B-11, B-13, B-15, and B-18 below depths of 4 to 15½ feet. The tan limestone occurs weathered or fractured in Borings B-1 through B-4, and B-10 above depths of 11 to 18 feet. Gray limestone seams are present within the tan limestone in Boring B-8 below a depth of 15 feet. The tan limestone varies from moderately hard to very hard (rock basis) with Texas Cone Penetrometer (THD) values of ¼ to 6¼ inches of penetration for 100 hammer blows.

Gray limestone with occasional shale seams and layers is next present in Borings B-1, B-3 through B-6, and B-10 through B-15 at depths of 13 to 18 feet, extending through boring termination at depths of 25 to 30 feet below existing grade. Tan limestone layers are noted within the gray limestone in Boring B-6 above a depth of 18 feet. The gray limestone is considered moderately hard to very hard (rock basis) with Texas Cone Penetrometer (THD) values of ½ to 2 inches of penetration for 100 hammer blows.

Gray shale with occasional gray limestone seams is next present in Borings B-2 and B-7 through B-9 at depths of 12 to 18 feet, extending through boring termination at depths of 25 to 30 feet below

existing grade. The gray shale varies from moderately hard to very hard (rock basis) with Texas Cone Penetrometer (THD) values of ¾ to 6½ inches of penetration for 100 hammer blows.

The Atterberg Limits tests indicate the various clays encountered at this site vary from moderately active to highly active with respect to moisture induced volume changes. Active clays can experience volume changes (expansion or contraction) with fluctuations in their moisture content. Select free swell test results indicate a relatively high potential for moisture-induced volume change from present in-situ moisture levels.

### 3.2 Groundwater Observations

The borings were drilled using continuous flight augers in order to observe groundwater seepage during drilling. No seepage was encountered during drilling and the borings were dry at completion. While it is not possible to accurately predict the magnitude of subsurface water fluctuation that might occur based upon these short-term observations, it should be recognized that groundwater conditions will vary with fluctuations in rainfall.

Fluctuations of the groundwater level can occur due to seasonal variations in the amount of rainfall; site topography and runoff; hydraulic conductivity of soil strata; and other factors not evident at the time the borings were performed. During wet periods of the year, seepage can occur in joints in the clays or atop/within the limestones. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

## 4.0 FOUNDATION RECOMMENDATIONS

### 4.1 General Foundation Considerations

Two independent design criteria must be satisfied in the selection of the type of foundation to support the proposed structures. First, the ultimate bearing capacity, reduced by a sufficient factor of safety, must not be exceeded by the bearing pressure transferred to the foundation soils. Second, due to consolidation or expansion of the underlying soils during the operating life of the structures, total and differential vertical movements must be within tolerable limits. The recommended foundation alternatives for the proposed structures are discussed below.

The moisture induced volume changes associated with the moderately to highly active clays present at this site indicate that shallow or near surface footings could be subject to differential movements of a potentially detrimental magnitude. The most positive foundation system for the proposed buildings would be situated below the zone of most significant seasonal moisture variations. A deep foundation system transferring column loads to a suitable bearing stratum is considered the most positive foundation system. Straight drilled reinforced concrete shafts penetrating the gray limestone or gray shale offer a positive foundation system and are recommended. Recommendations for this system are presented below.

## 4.2 Straight Shaft Design Parameters

### 4.2.1 *Pier Depth and Allowable Loading*

Recommendations and parameters for the design of cast-in-place straight-shaft drilled piers are outlined below. Specific recommendations for the construction and installation of the drilled piers are included in the following section, and shall be followed during construction.

| | |
|---|---|
| Bearing Stratum | Gray LIMESTONE or SHALE, w/ shale seams and layers or gray limestone seams |
| Depth of Bearing Stratum: | Approximately 12 to 18 feet below existing grades |
| Required Penetration: | All piers should penetrate into the bearing stratum a minimum of 3 feet. Deeper penetrations may be required to develop additional skin friction and/or uplift resistance. |
| Allowable End Bearing Capacity: | 25,000 psf |
| Allowable Skin Friction: | Applicable below a minimum penetration of 3 feet into the gray limestone or shale and below any temporary casing; 4,000 psf for compressive loads and 3,000 psf for tensile loads. |

The above values contain a safety factor of three (3). Drilled shafts should extend through any clay or weathered seams, through any gray limestone containing tan limestone seams, and bear only in competent, unweathered gray limestone or gray shale. Penetrations greater than the minimum penetration may be required to develop additional skin friction and/ or uplift resistance. A minimum pier diameter of 18 inches is recommended.

In order to develop full load carrying capacity in skin friction, adjacent shafts should have a minimum center-to-center spacing of 3 times the diameter of the larger shaft. Closer spacing may require

some reductions in skin friction and/or changes in installation sequences. Closely spaced shafts should be examined on a case-by-case basis. As a general guide, the design skin friction will vary linearly from the full value at a spacing of 3 diameters to 50 percent of the design value at 1.0 diameter.

Settlements for properly installed and constructed straight shafts in the gray limestone or gray shale will be primarily elastic and are estimated to be ¾ inch or less.

### 4.2.2 *Soil Induced Uplift Loads*

The drilled shafts could experience tensile loads as a result of post construction heave in the site soils. The magnitude of these loads varies with the shaft diameter, soil parameters, and particularly the in-situ moisture levels at the time of construction. In order to aid in the structural design of the reinforcement, the reinforcement quantity should be adequate to resist tensile forces based on soil adhesion equal to 1,800 psf acting over the upper 12 feet of the pier shaft. This load must be resisted by the dead load on the shaft, continuous vertical reinforcing steel in the shaft, and a shaft adhesion developed within the bearing strata as previously discussed. In order to aid in the structural design of the reinforcement, minimum reinforcing should be equal to 0.5 percent of the shaft area.

### 4.2.3 *Drilled Shaft Construction Considerations*

Drilled pier construction should be monitored by a representative of the geotechnical engineer to observe, among other things, the following items:

- Identification of bearing material
- Adequate penetration of the shaft excavation into the bearing layer
- The base and sides of the shaft excavation are clean of loose cuttings
- If seepage is encountered, whether it is of sufficient amount to require the use of temporary steel casing. If casing is needed it is important that the field representative observe that a high head of plastic concrete is maintained within the casing at all times during their extraction to prevent the inflow of water

Excavations for the shafts should be maintained in the dry. Precautions should be taken during the placement of reinforcing steel and concrete to prevent loose, excavated soil from falling into the excavation. Concrete should be placed as soon as practical after completion of the drilling, cleaning, and observation. Excavation for a drilled pier should be filled with concrete before the end of the

workday, or sooner if required to prevent deterioration of the bearing material. Prolonged exposure or inundation of the bearing surface with water will result in changes in strength and compressibility characteristics. If delays occur, the drilled pier excavation should be deepened as necessary and cleaned, in order to provide a fresh bearing surface.

The concrete should have a slump of 6 inches plus or minus 1 inch. The concrete should be placed in a manner to prevent the concrete from striking the reinforcing cage or the sides of the excavation. Concrete should be tremied to the bottom of the excavation to control the maximum free fall of the plastic concrete to less than 10 feet or focus the concrete between reinforcing steel to prevent segregation.

A drilling rig of sufficient size and weight will be necessary for drilling and/or coring through the hard layers to reach the desired bearing stratum and achieve the required penetration. It should be anticipated that hard to very hard zones can be present in the tan and gray limestones and shales. The hard to very hard layers can complicate pier drilling operations.

In addition to the above guidelines, the specifications from the Association of Drilled Shaft Contractors Inc. "Standards and Specifications for the Foundation Drilling Industry" as Revised 1999 or other recognized specifications for proper installation of drilled shaft foundation systems should be followed.

### 4.2.4 *Grade Beams*

All grade beams should be supported by the drilled shafts. A minimum 14-inch void space should be provided beneath all grade beams to prevent contact with the swelling clay soils. This void will serve to minimize distress resulting from swell pressures generated by the clays.

Grade beams may be cast on cardboard carton forms or formed above grade. If cardboard carton forms are used, care should be taken to not crush the carton forms, or allow the carton forms to become wet prior to or during concrete placement operations. A soil retainer should be provided to help prevent in-filling of this void.

Backfill against the exterior face of grade beams or panels should be properly compacted on-site clays. Compaction should be a minimum of 93 percent of ASTM D698, at a minimum of 2 percentage

points above the optimum moisture content determined by that test. This clay fill is intended to reduce surface water infiltration beneath the structure.

## 5.0 FLOOR SLABS AND EXTERIOR FLATWORK

### 5.1 Potential Vertical Movements

Lightly loaded floor slabs and/or exterior flatwork placed on-grade will be subject to movement as a result of moisture induced volume changes in the moderately to highly active clays present at this site. The clays expand (heave) with increases in moisture and contract (shrink) with decreases in moisture. The movement typically occurs as post construction heave. The potential magnitude of the moisture induced movements is rather indeterminate. It is influenced by the soil properties, overburden pressures, thickness of clays present and to a great extent by soil moisture levels at the time of construction. The greatest potential for post-construction movement occurs when the soils are in a dry condition at the time of construction. Based on the conditions encountered in the borings, potential moisture induced movements are estimated to vary from on the order of 1¾ to 8½ inches for soils in a dry condition for slabs placed at or near existing grade. Soil movements, significantly larger than estimated, could occur due to inadequate site grading, poor drainage, ponding of rainfall, and/or leaking pipelines.

Surrounding site amenities such as exterior flatwork will be subject to potential movements as described above. Subgrade preparation recommendations to reduce potential movements beneath exterior flatwork areas are presented below in Section 5.3.

### 5.2 Structurally Suspended Floor Slab

The most positive method of preventing slab distress due to swelling soils is to structurally suspend the interior slab. Due to the expansion potential of the site clays we recommend that the suspended floor slab be constructed on carton forms with a minimum 16-inch void space or crawl space.

Care should be taken to assure that the void boxes are not allowed to become wet or crushed prior to or during concrete placement and finishing operations. Corrugated steel, placed on the top of the carton forms, could be used to reduce the risk of crushing of the carton forms during concrete placement and finishing operations. As a quality control measure during construction, "actual"

concrete quantities placed should be checked against "anticipated" quantities. Significant concrete "overage" would be an early indication of a collapsed void.

If a crawl space is utilized, provision should be made to provide drainage of the crawl space below the slab, in the event water becomes trapped or seeps into this area. Drain inlets which are tied into the storm sewer or a sump and pump system may be necessary. Also, because of capillary moisture buildup, proper ventilation should be provided in the crawl space below the slab. Ventilation of the void below the floors should be provided if high humidity can cause problems with floor tile adhesives.

Vehicle or pedestrian ramps leading up to the buildings should be structurally connected to the building grade beams to avoid abrupt differential movement between the building slab and the ramps. Transitioning details will be required at the points where ramps connect with paving and slab on-grade elements. In addition, ramp slabs should be constructed so that slopes sufficient for effective drainage of surface water are still provided after potential differential movements.

### 5.3 Interior Floor Slabs and Exterior Flatwork

In conjunction with drilled shafts, interior slabs and/or exterior flatwork can be placed on a prepared subgrade. Slab-on-grade construction should only be considered if slab movement can be tolerated. Subgrade preparation alternatives have been requested to reduce the potential moisture induced movements to on the order of 1 inch. Reductions in anticipated movements can be achieved by using methods developed in this area to reduce on-grade slab movements. The more commonly used methods consist of placing non-expansive select fill beneath the slab and moisture conditioning the soils. The use of these methods will not eliminate the risk of unacceptable movements.

Readers should understand that a ground-supported floor slab or exterior flatwork can heave considerably if placed on dry, expansive clays. Based on the conditions encountered at the site the installation of a minimum of 2 feet of non-expansive select fill over a minimum of 12 feet of moisture conditioned clays should reduce potential moisture induced movements to on the order of 1 inch. Moisture conditioning is recommended to be achieved by mechanically reworking the clays as discussed below. Slabs not capable of tolerating this level of movement should be structurally suspended. These recommendations should be reviewed once a grading plan is finalized.

Strong consideration should be given to extending the moisture conditioning process beyond the building line to include entrances, sidewalks, porte-cocheres, flatwork or any other areas sensitive

to movement. Extending the moisture conditioning process beyond the building line is particularly recommended at building ingress and egress points. Outside the buildings, a single lift of select fill (6 to 8 inches) is recommended to minimize drying during construction.

Soil treatments presented in this section are referenced as an alternative to the use of a structurally suspended floor slab. The owner must fully understand that if the floor slab is placed on-grade, some movement and resultant cracking within the floor and interior wall partitions may occur. This upward slab movement and cracking is usually difficult and costly to repair, and may require continued maintenance expense.

It should be noted these methods of treatment are presented as an option for the owner's consideration. The options may or may not be practical or economically feasible, depending on the expected performance of the proposed building. The owner should be aware that this method will not prevent movement of soil-supported foundation elements, and can only reduce the magnitude of the movement. Placement of the floor slab on-grade represents a compromise between construction cost and risk of floor distress.

A properly engineered and constructed vapor barrier should be provided beneath slabs-on-grade which will be carpeted or receive moisture sensitive coverings or adhesives.

*Mechanical Reworking of Near-Surface Clays with 2' Select Fill Cap*

In general, the procedure is performed as follows:

1. Remove all existing pavements, surface vegetation, trees and associated root mats, organic topsoil and any other deleterious material.
2. Excavate to a minimum of 13.5 feet below finished grade. Near-surface fractured tan limestone seams and layers present within the clays must be excavated and removed (see Borings B-11 and B-14). It is not necessary to excavate competent and intact tan limestone present below 8- to 10-foot depths in all locations except in the area of Boring B-7 below a depth of 4 feet. Scarify the exposed subgrade at the base of the excavation to a depth of 8 inches, adjust the moisture, and compact at a minimum of 4 percentage points above optimum moisture to between 93 and 98 percent Standard Proctor density (ASTM D698). Over-compaction should not be allowed.
3. Fill pad to 2 feet below final grade using site excavated or similar clay soils. Rock fragments larger than 4 inches should be processed or discarded. The fill materials should be free of vegetation, debris, or otherwise deleterious materials. Compact in maximum 9-inch loose lifts at a minimum of 4 percentage points above optimum moisture to between 93 and 98 percent Standard Proctor density (ASTM D698). Field density tests should be taken as each lift of material is placed. Each lift should be compacted, tested, and documented prior to subsequent lift placement. Over-compaction should not be allowed.

4. Complete pad fill using a minimum of 2 feet of sandy clay/clayey sand non-expansive select fill with a Liquid Limit less than 35 and a Plasticity Index (PI) between 5 and 16. The select fill should be compacted in maximum 9-inch loose lifts at minus 2 to plus 3 percentage points of the soil's optimum moisture content at a minimum of 95 percent of Standard Proctor density (ASTM D698). The select fill should be placed within 48 hours of completing the installation of the moisture conditioned soils.

The above earthwork operations should be continuously observed and tested by an experienced geotechnician working in conjunction with the project geotechnical engineer.

## 6.0 EXPANSIVE SOIL CONSIDERATIONS

### 6.1 Site Drainage

An important feature of the project is to provide positive drainage away from the proposed structures. If water is permitted to stand next to or below the structures, excessive soil movements (heave) can occur. This could result in differential floor slab or foundation movement.

A well-designed site drainage plan is of utmost importance and surface drainage should be provided during construction and maintained throughout the life of the structures. Consideration should be given to the design and location of gutter downspouts, planting areas, or other features which would produce moisture concentration adjacent to or beneath the structure or paving. Consideration should be given to the use of self-contained, watertight planters. Joints next to the structure should be sealed with a flexible joint sealer to prevent infiltration of surface water. Proper maintenance should include periodic inspection for open joints and cracks and resealing as necessary.

Rainwater collected by the gutter system should be transported by pipe to a storm drain or to a paved area. If downspouts discharge next to the structures onto flatwork or paved areas, the area should be watertight in order to eliminate infiltration next to the structures.

### 6.2 Additional Design Considerations

The following information has been assimilated after examination of numerous projects constructed in active soils throughout the area. It is presented here for your convenience. If these features are incorporated in the overall design of the project, the performance of the structures should be improved.

- Special consideration should be given to completion items outside the building area, such as stairs, sidewalks, signs, etc. They should be adequately designed to sustain the potential vertical movements mentioned in the report.

- Roof drainage should be collected by a system of gutters and downspouts and transmitted away from the structure where the water can drain away without entering the building subgrade.

- Sidewalks should not be structurally connected to the building. They should be sloped away from the building so that water will drain away from the structure.

- The paving and the general ground surface should be sloped away from the building on all sides so that water will always drain away from the structure. Water should not be allowed to pond near the building after the slab has been placed.

- Trees and deep rooted shrubs should not be used as landscaping around the structure perimeter as the root systems can lead to desiccation of the subgrade soils. Any existing trees or trees to be planted should be at a minimum distance from the building such that the building will not fall within the drip line of the mature plants (usually one to one-and-one-half times the mature height of the tree).

- Every attempt should be made to limit the extreme wetting or drying of the subsurface soils since swelling and shrinkage will result. Standard construction practices of providing good surface water drainage should be used. A positive slope of the ground away from the foundation should be provided to carry off the run-off water both during and after construction.

- Backfill for utility lines or along the perimeter beams should consist of on-site material so that they will be stable. If the backfill is too dense or too dry, swelling may form a mound along the ditch line. If the backfill is too loose or too wet, settlement may form a sink along the ditch line. Either case is undesirable since several inches of movement is possible and floor cracks are likely to result. The soils should be processed using the previously discussed compaction criteria.

- Utility line details and fixtures must consider the potential for differential movement beneath any piping. In conjunction with a structural slab all underground utility lines should be isolated from expansive clays. A similar 16-inch void is recommended between the utility bottom and underlying clay soils. This prevents the utility lines from uplifting into the suspended slab.

## 7.0 SEISMIC CONSIDERATIONS

Based on the conditions encountered in the borings for the above-referenced project the IBC-2021 site classification is TYPE C for seismic evaluation.

# 8.0 EARTHWORK

## 8.1 Site Preparation & Material Requirements

Proposed construction areas should be stripped of vegetation, roots, old construction debris, and other organic material. It is estimated that the depth of stripping will be on the order of 4 to 6 inches. The actual stripping depth should be based on field observations with particular attention given to old drainage areas, uneven topography, and excessively wet soils. The stripped areas should be observed to determine if additional excavation is required to remove weak or otherwise objectionable materials that would adversely affect the fill placement or other construction activities.

The subgrade should be firm and able to support the construction equipment without displacement. Soft or yielding subgrade should be corrected and made stable before construction proceeds. The subgrade should be proof rolled to detect soft spots, which if exist, should be reworked to provide a firm and otherwise suitable subgrade. Proof rolling should be performed using a heavy pneumatic tired roller, loaded dump truck, or similar piece of equipment weighing a minimum 25 tons. The proof rolling operations should be observed by the project geotechnical engineer or his/her representative.

The on-site soils are suitable for use in general site grading. Imported general fill material should be clean soil with a Liquid Limit less than 60 and no rock greater than 4 inches in maximum dimension. The fill materials should be free of vegetation and debris. Excavated on-site limestone may be used for fill provided the material is crushed such that 50 percent passes the No. 4 sieve and no particles are larger than 4 inches in maximum dimension. As the in-situ limestones are generally moderately hard to very hard, significant processing of the limestone should be anticipated in order to utilize as fill. All fill materials should be free of vegetation and debris.

## 8.2 Placement and Compaction

Fill material should be placed in loose lifts not exceeding 8 inches in uncompacted thickness. The uncompacted lift thickness should be reduced to 4 inches for structure backfill zones requiring hand-operated power compactors or small self-propelled compactors. The fill material should be uniform with respect to material type and moisture content. Clods and chunks of material should be broken down and the fill material mixed by disking, blading, or plowing, as necessary, so that a material of uniform moisture and density is obtained for each lift. Water required for sprinkling to bring the fill material to the proper moisture content should be applied evenly through each layer.

The fill material should be compacted to a density ranging from 95 to 100 percent of maximum dry density as determined by ASTM D698, Standard Proctor. In conjunction with the compacting operation, the fill material should be brought to the proper moisture content. The moisture content for general earth fill should range from 2 percentage points below optimum to 5 percentage points above optimum (-2 to +5). These ranges of moisture contents are given as maximum recommended ranges. For some soils and under some conditions, the contractor may have to maintain a more narrow range of moisture content (within the recommended range) in order to consistently achieve the recommended density.

Field density tests should be taken as each lift of fill material is placed. As a guide, one field density test per lift for each 5,000 square feet of compacted area is recommended. For small areas or critical areas the frequency of testing may need to be increased to one test per 2,500 square feet. A minimum of 2 tests per lift should be required. The earthwork operations should be observed and tested on a continuing basis by an experienced geotechnician working in conjunction with the project geotechnical engineer.

Each lift should be compacted, tested, and approved before another lift is added. The purpose of the field density tests is to provide some indication that uniform and adequate compaction is being obtained. The actual quality of the fill, as compacted, should be the responsibility of the contractor and satisfactory results from the tests should not be considered as a guarantee of the quality of the contractor's filling operations.

If fill is to be placed on existing slopes that are steeper than five horizontal to one vertical, then the fill materials should be benched into the existing slopes in such a manner as to provide a good contact between the two materials and allow relatively horizontal lift placement.

Permanent slopes at the site should be as flat as practical to reduce creep and occurrence of shallow slides. The following slope angles are recommended as maximums. The presented angles refer to the total height of a slope. Site improvement should be maintained away from the top of the slope to reduce the possibility of damage due to creep or shallow slides.

| TABLE 8.2-1 Maximum Permanent Slope Angles | |
|---|---|
| **Height (ft.)** | **Horizontal to Vertical** |
| 0 – 3 | 1:1 |
| 3 – 6 | 2:1 |
| 6 – 9 | 3:1 |
| > 9 | 4:1 |

### 8.3 Trench Backfill

Trench backfill for pipelines or other utilities should be properly placed and compacted. Overly dense or dry backfill can swell and create a mound along the completed trench line. Loose or wet backfill can settle and form a depression along the completed trench line. Distress to overlying structures, pavements, etc. is likely if heaving or settlement occurs. On-site soil fill material is recommended for trench backfill. Care should be taken not to use free draining granular material, to prevent the backfilled trench from becoming a french drain and piping surface or subsurface water beneath structures, pipelines, or pavements. If a higher class bedding material is required for the pipelines, a lean concrete bedding will limit water intrusion into the trench and will not require compaction after placement. The soil backfill should be placed in approximately 4- to 6-inch loose lifts. The density and moisture content should be as recommended for fill in Section 8.2, Placement and Compaction, of this report. A minimum of one field density test should be taken per lift for each 150 linear feet of trench, with a minimum of 2 tests per lift.

### 8.4 Excavation

Based on the exploration borings, excavations will encounter limestone in major intact units. This limestone is generally moderately hard to very hard and will require heavy duty specialized equipment for excavation. In addition, overexcavation should be anticipated within the limestones. Overexcavation may result from large blocks or chunks breaking along either fractured/weathered or clay seams beyond the planned excavation.

The side slopes of excavations through the overburden soils should be made in such a manner to provide for their stability during construction. Existing structures, pipelines or other facilities, which are constructed prior to or during the currently proposed construction and which require excavation, should be protected from loss of end bearing or lateral support.

Temporary construction slopes and/or permanent embankment slopes should be protected from surface runoff water. Site grading should be designed to allow drainage at planned areas where erosion protection is provided, instead of allowing surface water to flow down unprotected slopes.

Trench safety recommendations are beyond the scope of this report. The contractor must comply with all applicable safety regulations concerning trench safety and excavations including, but not limited to, OSHA regulations.

### 8.5 Acceptance of Imported Fill

Any soil imported from off-site sources should be tested for compliance with the recommendations for the particular application and approved by the project geotechnical engineer prior to the materials being used. The owner should also require the contractor to obtain a written, notarized certification from the landowner of each proposed off-site soil borrow source stating that to the best of the landowner's knowledge and belief there has never been contamination of the borrow source site with hazardous or toxic materials. The certification should be furnished to the owner prior to proceeding to furnish soils to the site. Soil materials derived from the excavation of underground petroleum storage tanks should not be used as fill on this project.

### 8.6 Soil Corrosion Potential

Specific testing for soil corrosion potential was not included in the scope of this study. However, based upon past experience on other projects in the vicinity, the soils at this site may be corrosive. Standard construction practices for protecting metal pipe and similar facilities in contact with these soils should be used.

### 8.7 Erosion and Sediment Control

All disturbed areas should be protected from erosion and sedimentation during construction, and all permanent slopes and other areas subject to erosion or sedimentation should be provided with permanent erosion and sediment control facilities. All applicable ordinances and codes regarding erosion and sediment control should be followed.

# 9.0 PAVEMENTS

## 9.1 General Pavement Considerations

Pavement performance is impacted by many factors far beyond what is normally included in engineering design. Wherein pavement analyses should include establishing an appropriate thickness of concrete and appropriate subgrade remediation/ stabilization, other factors such as location of trees adjacent to the paving and water conditions in grassed areas adjacent to curbing impact the performance of the pavement. In addition, the activity of the soil below the pavement can cause differential expansive soil conditions under the pavement.

The surficial clays in the area of the proposed pavements are highly plastic. These soils are subject to loss in support value with the moisture increases which occur beneath pavement sections. The success of the pavement subgrade is subgrade soil strength and control of water.

## 9.2 Lime-Induced Heaving

Lime-induced heaving is caused when hydrated lime is added to a soil with a high soluble-sulfate concentration. The lime reacts with the sulfates to cause potentially large volumetric changes in the soil.

Soluble sulfate levels in soils on the order of 2,000 parts-per-million (ppm) or less are usually of low concern and warrant only observation of the subgrade during the stabilization process. Soluble sulfate levels on the order of 2,000 to 6,000 ppm usually warrant a double lime process, with the first treatment of lime consisting of ½ the recommended concentration and the second lime treatment consisting of the full recommended concentration. Sulfate levels higher than 6,000 ppm usually require a double-lime process, with the two full concentration lime treatments.

Recovered samples were tested for soluble sulfate levels and these results are presented on Plate A.25. Tested soluble sulfate levels varied from less than 100 ppm to 11,840 ppm. For areas of high soluble sulfate concentration, a double lime process is recommended, with the two full concentration lime treatments. Once the subgrade is established, the actual subgrade should be retested to verify sulfate concentrations and delineate sulfate rich areas of paving subgrade. In addition, it is recommended that during the curing period of the double lime treatment, the subgrade be supplied with ample moisture and it should be checked for any volumetric changes that may indicate a lime-induced heaving condition.

In lieu of a lime stabilized subgrade for pavement consisting of Portland cement concrete, the recommended Portland cement concrete (PCC) pavement thicknesses presented in Section 9.4 may be increased by 2 inches, and placed atop a properly compacted subgrade.

Alternatively, in lieu of a lime stabilized subgrade, a flexible base meeting TxDOT Item 247, Type A, Grade 1/2 may be utilized on an equal basis, and placed atop a properly compacted subgrade. The flexible base should be compacted to at least 95 percent of Standard Proctor Density and at a moisture content between -2 and +5 percentage points of the optimum moisture value. These options in lieu of lime stabilizing the subgrade present a relatively quick, straight forward solution to preparing the subgrade prior to pavement placement, and also alleviate lime-induced heave concerns.

### 9.3 Pavement Subgrade Stabilization with Lime

Based on the exploration borings, subgrade soils are anticipated to consist of highly plastic clays. These clays are subject to loss in support value with the moisture increases which occur beneath pavement sections. They react with hydrated lime, which serves to improve and maintain their support value. Treatment of these soils with hydrated lime will improve their subgrade characteristics to support area paving.

Prior to lime stabilization, the subgrade should be proofrolled with heavy pneumatic equipment. Any soft or pumping areas should be undercut to a firm subgrade and properly backfilled as described in the Earthwork section. The subgrade should be scarified to a minimum depth of 6 inches and uniformly compacted to a minimum of 95 percent of Standard Proctor density (ASTM D698), to minus 2 to plus 4 percentage points of the optimum moisture content determined by that test. It should then be protected and maintained in a moist condition until the pavement is placed.

Prior to lime stabilization, the subgrade should be further tested for soluble sulfates. Any locations with soluble sulfates greater than 2,000 ppm should use alternative methods of subgrade preparation (i.e., double lime treatment, use of flex base or increasing pavement thickness atop unstabilized subgrade). We recommend a minimum of 8 percent hydrated lime be used to modify the clay subgrade soils. The estimated amount of hydrated lime required to stabilize the subgrade should be on the order of 36 pounds per square yard for a 6-inch depth, based on a soil dry unit weight of 100 pcf. The hydrated lime should be thoroughly mixed and blended with the upper 6 inches of the clay subgrade (TxDOT Item 260). Installation should utilize a double lime process, consisting of the full concentration of the

above recommended concentration and a second lime treatment consisting of the full recommended concentration, with a full mellowing time of 7 days per TxDOT Item 260 between applications. The hydrated lime should meet the requirements of Item 260 (Type A) in the Texas Department of Transportation (TxDOT) Standard Specifications for Construction of Highways, Streets and Bridges, 2014 Edition. Ironstone nodules, calcareous nodules, and calcareous deposits in the surficial soils can complicate mixing of the soil and lime.

We recommend that subgrade stabilization extend to at least one foot beyond pavement edges to aid in reducing pavement movements and cracking along the curb line due to seasonal moisture variations after construction. Each construction area should be shaped to allow drainage of surface water during earthwork operations, and surface water should be pumped immediately from each construction area after each rain and a firm subgrade condition maintained. Water should not be allowed to pond in order to prevent percolation and subgrade softening, and lime should be added to the subgrade after removal of all surface vegetation and debris. Sand should be specifically prohibited beneath pavement areas, since these more porous soils can allow water inflow, resulting in heave and strength loss of subgrade soils (lime stabilized soil will be allowed for fine grading). After fine grading each area in preparation for paving, the subgrade surface should be lightly moistened, as needed, and recompacted to obtain a tight non-yielding subgrade.

Surface drainage is critical to the performance of this pavement. Water should be allowed to exit the pavement surface quickly. All pavement construction should be performed in accordance with the following procedures.

### 9.4 Pavement Sections

The project will include the construction of parking lots and/or drives. At the time of this investigation, vehicle traffic studies were not available. Therefore, several rigid and flexible pavement sections are presented for a 20-year design life based on our experience with similar facilities for Light-Duty Parking Areas, Medium-Duty Parking Areas and Drives, and Medium- to Heavy-Duty Drives. In general, these areas are defined as follows:

Light-Duty Parking Areas are those lots and drives subjected almost exclusively to passenger cars, with an occasional light- to medium-duty truck (2 to 3 per week)

Medium-Duty Parking Areas and Drives are those lots subjected to a variety of light-duty vehicles to medium-duty vehicles and an occasional heavy-duty truck, including an occasional 85-kip fire apparatus (1 to 2 per week).

Medium to Heavy-Duty Drives are those drives subjected to a variety of light to heavy-duty vehicles. These pavements include areas subject to significant truck traffic or trash vehicles.

We recommend that rigid pavements be utilized at this project whenever possible, since they tend to provide better long-term performance when subjected to significant slow moving and turning traffic.

If an asphaltic concrete pavement is used, we recommend a full depth asphaltic concrete section having a minimum total thickness of 6 inches for light-duty parking areas, 7 inches for medium-duty parking areas and drives, and 8 inches for medium- to heavy-duty drives. A minimum surface course thickness of 2 inches is recommended for asphaltic concrete pavements.

If Portland cement concrete pavement, a minimum thickness of 5 inches of concrete is recommended for light-duty areas, 6 inches for medium-duty parking areas and drive, and 7 inches for medium- to heavy-duty drives.

A California Bearing Ratio or other strength tests were not performed because they were not within the scope of our services on this project. A subgrade modulus of 100 psi was considered appropriate for the near-surface soils. If heavier vehicles are planned, the above cross sections can be confirmed by performing strength tests on the subgrade materials once the traffic characteristics are established. Periodic maintenance of pavement structures normally improves the durability of the overall pavement and enhances its expected life.

The above sections should be considered minimum pavement thicknesses and higher traffic volumes and heavy trucks may require thicker pavement sections. Additional recommendations can be provided after traffic volumes and loads are known. Periodic maintenance should be anticipated for minimum pavement thickness. This maintenance should consist of sealing cracks and timely repair of isolated distressed areas.

### 9.5 Pavement Material Requirements

Reinforced Portland Cement Concrete: Reinforced Portland cement concrete pavement should consist of Portland cement concrete having a 28-day compressive strength of at least 3,500 psi. The mix should be designed in accordance with the ACI Code 318 using 3 to 6 percent air entrainment. The pavement should be adequately reinforced with temperature steel and all construction joints or expansion/contraction joints should be provided with load transfer dowels. The spacing of the joints

will depend primarily on the type of steel used in the pavement. We recommend using No. 3 steel rebar spaced at 18 inches on center in both the longitudinal and transverse direction. Control joints formed by sawing are recommended every 12 to 15 feet in both the longitudinal and transverse direction. The cutting of the joints should be performed as soon as the concrete has "set-up" enough to allow for sawing operations.

Hot Mix Asphaltic Concrete Surface Course: Item 340, Type D, Texas Department of Transportation Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, 2014 Edition.

Hot Mix Asphaltic Concrete Base Course: Item 340, Type A or B, Texas Department of Transportation Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, 2014 Edition.

Lime Stabilized Subgrade: Lime treatment for base course (road mix) - Item 260, Texas Department of Transportation Standard Specifications for Construction and Maintenance of Highways, Streets, and Bridges, 2014 Edition.

Flexible Base: Crushed Stone Flexible Base – Item 247, Type A, Grade 1/2, Texas Department of Transportation Standard Specifications for Construction of Maintenance of Highways, Streets, and Bridges, 2014 Edition.

### 9.6 General Pavement Considerations

The design of the pavement drainage and grading should consider the potential for differential ground movement due to future soil swelling of 8½ inches. In order to minimize rainwater infiltration through the pavement surface, and thereby minimizing future upward movement of the pavement slabs all cracks and joints in the pavement should be sealed on a routine basis after construction. Reduction in potential differential ground movement can be reduced in a similar manner as discussed in Section 5.3. Should this level or an intermediate level of movement reduction be desired, contact this office for additional recommendations.

## 10.0 CONSTRUCTION OBSERVATIONS

In any geotechnical investigation, the design recommendations are based on a limited amount of information about the subsurface conditions. In the analysis, the geotechnical engineer must assume the subsurface conditions are similar to the conditions encountered in the borings. However, quite often during construction anomalies in the subsurface conditions are revealed. Should such anomalies be discovered it is recommended that Catholic Diocese of Fort Worth or their designated representative immediately notify CMJ Engineering, Inc. before proceeding further with construction to allow CMJ Engineering, Inc. to reconsider its recommendations as necessary. It is also recommended that Catholic Diocese of Fort Worth retain CMJ Engineering, Inc. to observe earthwork and foundation installation and perform materials evaluation during the construction phase of the project. This enables the geotechnical engineer to stay abreast of the project and to be readily available to evaluate unanticipated conditions, to conduct additional tests if required and, when necessary, to recommend alternative solutions to unanticipated conditions. Until these construction phase services are performed by the project geotechnical engineer, the recommendations contained in this report on such items as final foundation bearing elevations, proper soil moisture condition, and other such subsurface related recommendations shall only be considered as preliminary, and not final, recommendations.

It is proposed that construction phase observation and materials testing commence by the project geotechnical engineer at the outset of the project. Experience has shown that the most suitable method for procuring these services is for the owner or the owner's design engineers to contract directly with the project geotechnical engineer. This results in a clear, direct line of communication between the owner and the owner's design engineers and the geotechnical engineer.

## 11.0 REPORT CLOSURE

The boring logs shown in this report contain information related to the types of soil encountered at specific locations and times and show lines delineating the interface between these materials. The logs also contain our field representative's interpretation of conditions that are believed to exist in those depth intervals between the actual samples taken. Therefore, these boring logs contain both factual and interpretive information. Laboratory soil classification tests were also performed on samples from selected depths in the borings. The results of these tests, along with visual-manual procedures were used to generally classify each stratum. Therefore, it should be understood that the classification data on the logs of borings represent visual estimates of classifications for those

portions of each stratum on which the full range of laboratory soil classification tests were not performed. It is not implied that these logs are representative of subsurface conditions at other locations and times.

With regard to groundwater conditions, this report presents data on groundwater levels as they were observed during the course of the field work. In particular, water level readings have been made in the borings at the times and under conditions stated in the text of the report and on the boring logs. It should be noted that fluctuations in the level of the groundwater table can occur with passage of time due to variations in rainfall, temperature and other factors. Also, this report does not include quantitative information on rates of flow of groundwater into excavations, on pumping capacities necessary to dewater the excavations, or on methods of dewatering excavations. Unanticipated soil conditions at a construction site are commonly encountered and cannot be fully predicted by mere soil samples, test borings or test pits. Such unexpected conditions frequently require that additional expenditures be made by the owner to attain a properly designed and constructed project. Therefore, provision for some contingency fund is recommended to accommodate such potential extra cost.

The analyses, conclusions and recommendations contained in this report are based on site conditions as they existed at the time of our field investigation and further on the assumption that the exploratory borings are representative of the subsurface conditions throughout the site; that is, the subsurface conditions everywhere are not significantly different from those disclosed by the borings at the time they were completed. If, during construction, different subsurface conditions from those encountered in our borings are observed, or appear to be present in excavations, we must be advised promptly so that we can review these conditions and reconsider our recommendations where necessary. If there is a substantial lapse of time between submission of this report and the start of the work at the site (more than twelve months is considered a substantial lapse of time; however, depending on the circumstances, less than six months may be considered a substantial lapse of time), if conditions have changed due either to natural causes or to construction operations at or adjacent to the site, or if structure locations, structural loads or finish grades are changed, we urge that we be promptly informed and retained to review our report to determine the applicability of the conclusions and recommendations, considering the changed conditions and/or time lapse. In this regard, if (a) construction at the site does not start within twelve months of the date of this report and (b) CMJ Engineering, Inc. is not present at the site when construction starts to confirm that conditions

have not changed since the date of this report, the information in this report cannot be relied upon or used for any purpose.

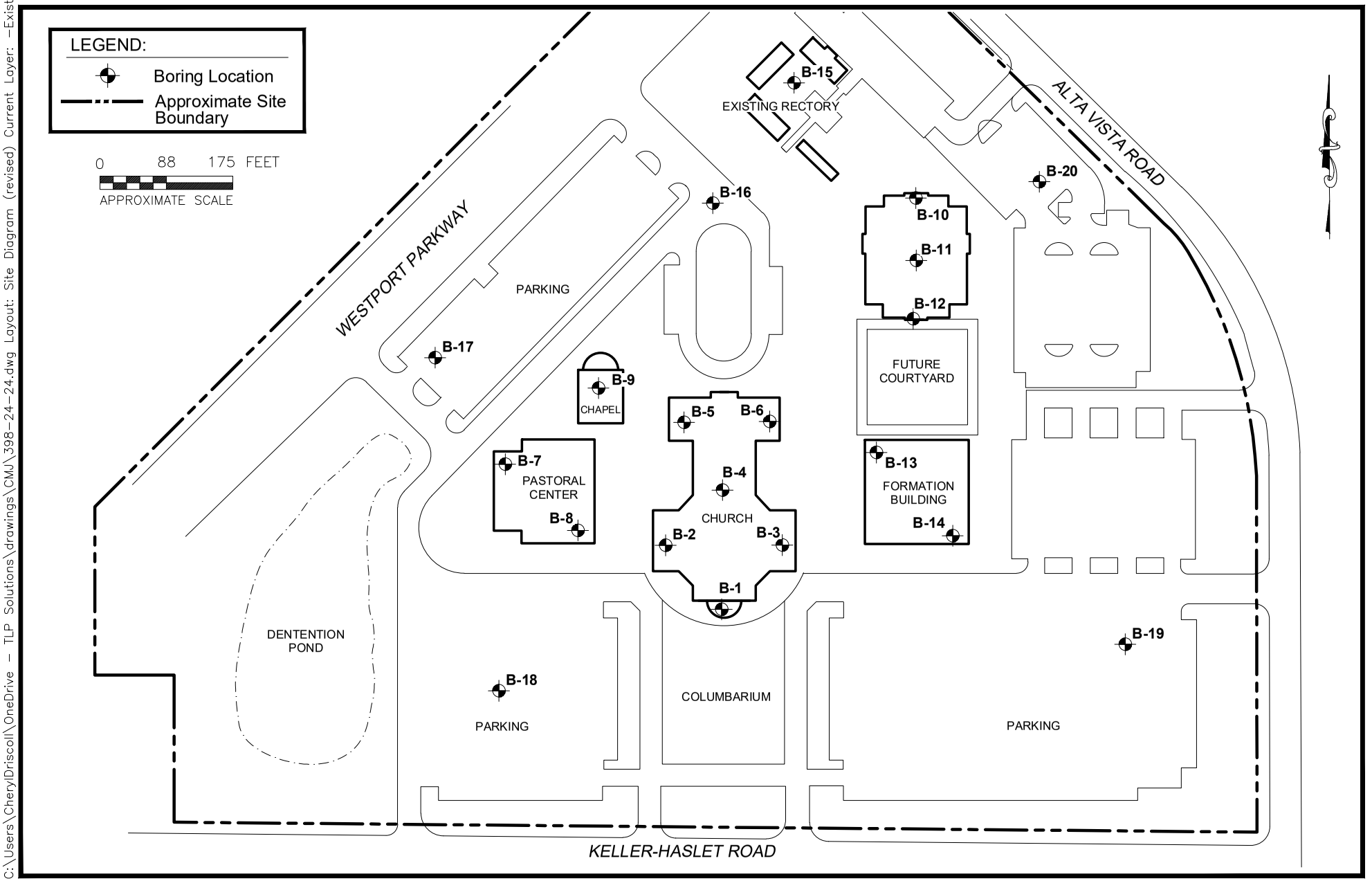
Further, it is urged that CMJ Engineering, Inc. be retained to review those portions of the plans and specifications for this particular project that pertain to earthwork and foundations as a means to determine whether the plans and specifications are consistent with the recommendations contained in this report. In addition, we are available to observe construction, particularly the compaction of structural fill, or backfill and the construction of foundations as recommended in the report, and such other field observations as might be necessary.

The scope of our services did not include any environmental assessment or investigation for the presence or absence of wetlands or hazardous or toxic materials in the soil, surface water, groundwater or air, on or below or around the site.

This report has been prepared for use in developing an overall design concept. Paragraphs, statements, test results, boring logs, diagrams, etc. should not be taken out of context, nor utilized without a knowledge and awareness of their intent within the overall concept of this report. The reproduction of this report, or any part thereof, supplied to persons other than the owner, should indicate that this study was made for design purposes only and that verification of the subsurface conditions for purposes of determining difficulty of excavation, trafficability, etc. are responsibilities of the contractor.

This report has been prepared for the exclusive use of Catholic Diocese of Fort Worth for specific application to design of this project. The only warranty made by us in connection with the services provided is that we have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of our profession practicing in the same or similar locality. No other warranty, expressed or implied, is made or intended.

* * * *




Date: 05/15/24 C:\Users\CherylDriscoll\OneDrive - TLP Solutions\drawings\CMJ\398-24-24.dwg Layout: Site Diagram (revised) Current Layer: -Existi

Plate A.1

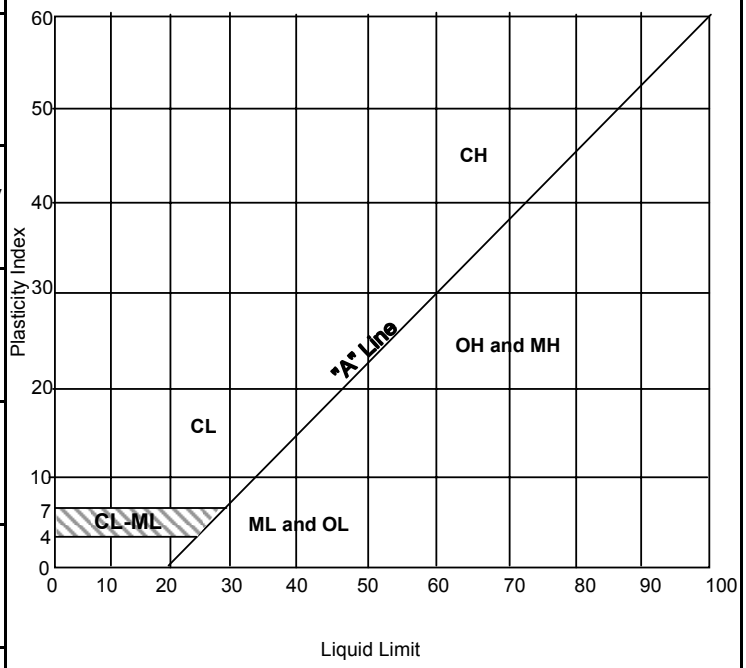
# PLAN OF BORINGS

St. Teresa of Calcutta Parish
13717 Alta Vista Road
Fort Worth, Texas

CMJ Engineering

CMJ Project No. 398-24-24

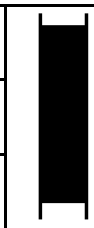
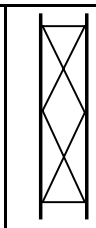
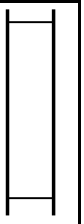
| Major Divisions | | | Grp. Sym. | Typical Names | Laboratory Classification Criteria | |
|---|---|---|---|---|---|---|
| Coarse-grained soils (more than half of the material is larger than No. 200 sieve size) | Gravels (More than half of coarse fraction is larger than No. 4 sieve size) | Clean gravels (Little or no fines) | GW | Well-graded gravels, gravel-sand mixtures, little or no fines | Determine percentages of sand and gravel from grain size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than 5 percent.....GW, GP, SW, SP; More than 12 percent.....GM, GC, SM, SC; 5 to 12 percent.....*Borderline* cases requiring dual symbols | $C_u = \frac{D_{60}}{D_{10}}$ greater than 4: $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3 |
| | | | GP | Poorly graded gravels, gravel-sand mixtures, little or no fines | | Not meeting all gradation requirements for GW |
| | | Gravels with fines (Appreciable amount of fines) | GM | Silty gravels, gravel-sand-silt mixtures | Liquid and Plastic limits below "A" line or P.I. greater than 4 | Liquid and plastic limits plotting in hatched zone between 4 and 7 are borderline cases requiring use of dual symbols |
| | | | GC | Clayey gravels, gravel-sand-clay mixtures | Liquid and Plastic limits above "A" line with P.I. greater than 7 | |
| | Sands (More than half of coarse fraction is smaller than No. 4 sieve size) | Clean sands (Little or no fines) | SW | Well-graded sands, gravelly sands, little or no fines | | $C_u = \frac{D_{60}}{D_{10}}$ greater than 6: $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3 |
| | | | SP | Poorly graded sands; gravelly sands, little or no fines | | Not meeting all gradation requirements for SW |
| | | Sands with fines (Appreciable amount of fines) | SM | Silty sands, sand-silt mixtures | Liquid and Plastic limits below "A" line or P.I. less than 4 | Liquid and plastic limits plotting between 4 and 7 are borderline cases requiring use of dual symbols |
| | | | SC | Clayey sands, sand-clay mixtures | Liquid and Plastic limits above "A" line with P.I. greater than 7 | |
| Fine-grained soils (More than half of material is smaller than No. 200 sieve) | Silts and clays (Liquid limit less than 50) | | ML | Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, or clayey silts with slight plasticity | | |
| | | | CL | Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, and lean clays | | |
| | | | OL | Organic silts and organic silty clays of low plasticity | | |
| | Silts and clays (Liquid limit greater than 50) | | MH | Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts | | |
| | | | CH | Inorganic clays of high plasticity, fat clays | | |
| | | | OH | Organic clays of medium to high plasticity, organic silts | | |
| | Highly Organic soils | | Pt | Peat and other highly organic soils | | |




Plasticity Chart

**UNIFIED SOIL CLASSIFICATION SYSTEM** **PLATE A.2**

## SOIL OR ROCK TYPES

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| GRAVEL | LEAN CLAY | LIMESTONE |  |  |  |  |  |  |
| SAND | SANDY | SHALE | | | | | | | | | |
| SILT | SILTY | SANDSTONE | | | | | | | | | |
| HIGHLY PLASTIC CLAY | CLAYEY | CONGLOMERATE | Shelby Tube | Auger | Split Spoon | Rock Core | Cone Pen | No Recovery |

## TERMS DESCRIBING CONSISTENCY, CONDITION, AND STRUCTURE OF SOIL

### Fine Grained Soils (More than 50% Passing No. 200 Sieve)

| Descriptive Item | Penetrometer Reading, (tsf) |
|---|---|
| Soft | 0.0 to 1.0 |
| Firm | 1.0 to 1.5 |
| Stiff | 1.5 to 3.0 |
| Very Stiff | 3.0 to 4.5 |
| Hard | 4.5+ |

### Coarse Grained Soils (More than 50% Retained on No. 200 Sieve)

| Penetration Resistance (blows/foot) | Descriptive Item | Relative Density |
|---|---|---|
| 0 to 4 | Very Loose | 0 to 20% |
| 4 to 10 | Loose | 20 to 40% |
| 10 to 30 | Medium Dense | 40 to 70% |
| 30 to 50 | Dense | 70 to 90% |
| Over 50 | Very Dense | 90 to 100% |

### Soil Structure

| | |
|---|---|
| Calcareous | Contains appreciable deposits of calcium carbonate; generally nodular |
| Slickensided | Having inclined planes of weakness that are slick and glossy in appearance |
| Laminated | Composed of thin layers of varying color or texture |
| Fissured | Containing cracks, sometimes filled with fine sand or silt |
| Interbedded | Composed of alternate layers of different soil types, usually in approximately equal proportions |

## TERMS DESCRIBING PHYSICAL PROPERTIES OF ROCK

### Hardness and Degree of Cementation

| | |
|---|---|
| Very Soft or Plastic | Can be remolded in hand; corresponds in consistency up to very stiff in soils |
| Soft | Can be scratched with fingernail |
| Moderately Hard | Can be scratched easily with knife; cannot be scratched with fingernail |
| Hard | Difficult to scratch with knife |
| Very Hard | Cannot be scratched with knife |
| Poorly Cemented or Friable | Easily crumbled |
| Cemented | Bound together by chemically precipitated material; Quartz, calcite, dolomite, siderite, and iron oxide are common cementing materials. |

### Degree of Weathering

| | |
|---|---|
| Unweathered | Rock in its natural state before being exposed to atmospheric agents |
| Slightly Weathered | Noted predominantly by color change with no disintegrated zones |
| Weathered | Complete color change with zones of slightly decomposed rock |
| Extremely Weathered | Complete color change with consistency, texture, and general appearance approaching soil |

**KEY TO CLASSIFICATION AND SYMBOLS** **PLATE A.3**

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-1 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 25.0' | 5-21-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ ironstone nodules and calcareous nodules, very stiff to hard | | | 4.5+ | | | | | 22 | | |
| | | | | | | 4.5+ | | | | | 22 | | |
| | | | - firm to stiff, 2' to 4' | | | 1.75 | | | | | 26 | 96 | 1740 |
| | | | | | | 1.25 | | | | | 28 | | |
| | | | - grades brown below 4' | | | 3.5 | | | | | 22 | | |
| 5 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 4.5+ | | 65 | 20 | 45 | 20 | 108 | |
| | | | | | | | | | | | | | |
| | | | | | | 4.5+ | | | | | 18 | | |
| 10 | | | **LIMESTONE**, tan, weathered | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | **LIMESTONE**, tan, very hard | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 100/0.5" | | | | | | | |
| 15 | | | **LIMESTONE**, gray, very hard | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 100/0.75" | | | | | | | |
| 20 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 100/0.5" | | | | | | | |
| 25 | | | | | | | | | | | | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

LOG OF BORING NO. **B-1**

**PLATE A.4**

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-2 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 30.0' | 5-21-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ ironstone nodules and calcareous nodules, stiff to very stiff | | | 3.25 | | | | | 25 | | |
| | | | | | | 2.0 | | 59 | 22 | 37 | 28 | | |
| | | | - soft to stiff below 2' | | | 1.0 | | | | | 32 | 89 | 1140 |
| | | | | | | 1.5 | | | | | 30 | | |
| | | | - grades brown, hard below 4' | | | 4.5+ | | | | | 20 | | |
| 5 | | | | | | | | | | | | | |
| | | | | | | 4.5+ | | | | | 20 | | |
| | | | **LIMESTONE**, tan, weathered, w/ clay seams and layers, soft | | | 100/6.25" | | | | | | | |
| 10 | | | | | | | | | | | | | |
| | | | **LIMESTONE**, tan, w/ clay seams and layers, very hard | | | | | | | | | | |
| | | | | | | 100/0.25" | | | | | | | |
| 15 | | | | | | | | | | | | | |
| | | | **SHALE**, gray, moderately hard | | | | | | | | | | |
| | | | | | | 100/6.5" | | | | | | | |
| 20 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 100/4.5" | | | | | | | |
| 25 | | | | | | | | | | | | | |
| | | | - w/ gray limestone seams below 27' | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 100/3.125" | | | | | | | |
| 30 | | | | | | | | | | | | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

LOG OF BORING NO. **B-2**

**PLATE A.5**

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-3 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 25.0' | 5-21-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ ironstone nodules and calcareous nodules, stiff | | | 2.75 | | | | | 31 | | |
| | | | | | | 2.5 | | | | | 23 | | |
| | | | - soft, 2' to 4' | | | 0.75 | | | | | 26 | 97 | 1140 |
| | | | | | | 0.75 | | | | | 31 | | |
| | | | - hard below 4' | | | 4.5+ | | | | | 21 | | |
| 5 | | | **SHALY CLAY**, light brown and gray, w/ ironstone nodules, calcareous nodules, and gypsum crystal deposits, hard | | | | | | | | | | |
| | | | | | | 4.5+ | | 77 | 21 | 56 | 20 | 109 | |
| | | | | | | 4.5+ | | | | | 21 | | |
| 10 | | | **LIMESTONE**, tan, weathered, w/ clay seams | | | | | | | | | | |
| | | | **LIMESTONE**, tan | | | | | | | | | | |
| | | | **LIMESTONE**, gray, w/ occasional gray shale seams, hard to very hard | | | 100/0.875" | | | | | | | |
| 15 | | | | | | | | | | | | | |
| | | | | | | 100/1.25" | | | | | | | |
| 20 | | | | | | | | | | | | | |
| | | | | | | 100/0.75" | | | | | | | |
| 25 | | | | | | | | | | | | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

LOG OF BORING NO. **B-3**

**PLATE A.6**

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-4 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 25.0' | 5-21-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ ironstone nodules and calcareous nodules, firm to stiff | | | 4.5+ | | | | | 24 | | |
| | | | - hard above 1' | | | 1.5 | | | | | 30 | 90 | 1890 |
| | | | | | | 1.25 | | | | | 31 | | |
| | | | | | | 2.25 | | | | | 27 | | |
| 5 | | | | | | 2.5 | | | | | 24 | | |
| | | | **CLAY**, light brown, w/ ironstone nodules and calcareous nodules, hard | | | | | | | | | | |
| | | | | | | 4.5+ | | 65 | 20 | 45 | 18 | | |
| | | | **LIMESTONE**, tan, weathered, w/ clay seams and layers, moderately hard | | | 100/6.25" | | | | | | | |
| 10 | | | | | | | | | | | | | |
| | | | **LIMESTONE**, tan, w/ clay seams, very hard | | | | | | | | | | |
| | | | | | | 100/0.375" | | | | | | | |
| 15 | | | **LIMESTONE**, gray, hard to very hard | | | | | | | | | | |
| | | | - w/ gray shale seams and layers below 18' | | | 100/0.625" | | | | | | | |
| 20 | | | | | | | | | | | | | |
| | | | | | | 100/1.25" | | | | | | | |
| 25 | | | | | | | | | | | | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

LOG OF BORING NO. **B-4**

**PLATE A.7**

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-5 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 30.0' | 5-23-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ calcareous nodules, firm to stiff | | | 1.25 | | | | | 32 | | |
| | | | | | | 1.5 | | | | | 26 | | |
| | | | - w/ ironstone nodules below 2' | | | 1.5 | | | | | 25 | | |
| | | | | | | 2.0 | | | | | 25 | | |
| 5 | | | **SHALY CLAY**, light brown, w/ ironstone nodues and calcareous nodules, hard | | | 4.5+ | | 53 | 16 | 37 | 17 | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 4.5+ | | | | | 21 | | |
| | | | | | | | | | | | | | |
| | | | - w/ limestone fragments below 9' | | | 4.5+ | | | | | 17 | | |
| 10 | | | **LIMESTONE**, tan, w/ clay seams, moderately hard | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 15 | | | | | | 100/2.5" | | | | | | | |
| | | | **LIMESTONE**, gray, w/ gray shale seams, moderately hard to hard | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 20 | | | | | | 100/2" | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 25 | | | | | | 100/1.75" | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 30 | | | | | | 100/2" | | | | | | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

LOG OF BORING NO. **B-5**

**PLATE A.8**

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-6 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 30.0' | 5-23-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown to brown, w/ calcareous nodules, firm to stiff | | | 2.0 | | | | | 29 | | |
| | | | | | | 1.5 | | | | | 28 | | |
| | | | | | | 2.5 | | | | | 28 | | |
| | | | | | | 1.75 | | | | | 26 | | |
| 5 | | | - w/ ironstone nodules below 4' | | | 2.5 | | | | | 25 | 101 | 3000 |
| | | | **SHALY CLAY**, light reddish brown and gray, w/ iron stains, iron seams, ironstone nodules, and calcareous nodules, hard | | | 4.5+ | | | | | 22 | | |
| 10 | | | | | | 4.5+ | | 67 | 21 | 46 | 18 | 112 | |
| 15 | | | **LIMESTONE**, gray, w/ tan limestone layers, moderately hard to hard | | | 100/2" | | | | | | | |
| | | | **LIMESTONE**, gray, hard to very hard | | | 100/1.25" | | | | | | | |
| 20 | | | | | | | | | | | | | |
| 25 | | | | | | 100/1.5" | | | | | | | |
| 30 | | | | | | 100/0.875" | | | | | | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

LOG OF BORING NO. **B-6**

**PLATE A.9**

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-7 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 25.0' | 5-23-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ ironstone nodules and calcareous nodules, stiff to very stiff | | | 3.25 | | | | | 25 | | |
| | | | | | | 2.75 | | | | | 25 | | |
| | | | **SILTY SHALY CLAY**, light brown, w/ weathered limestone seams, ironstone nodules, and calcareous nodules, stiff | | | 2.25 | | | | | 26 | | |
| | | | | | | 1.75 | | 37 | 16 | 21 | 18 | 109 | |
| | | | | | | 100/4.5" | | | | | | | |
| 5 | | | **LIMESTONE**, tan, w/ clay seams, moderately hard | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 100/3" | | | | | | | |
| 10 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | **SHALE**, gray, w/ gray limestone seams, moderately hard | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 100/2.75" | | | | | | | |
| 15 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 100/2.5" | | | | | | | |
| 20 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 100/2.25" | | | | | | | |
| 25 | | | | | | | | | | | | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-8 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 30.0' | 5-23-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ ironstone nodules, stiff | | | 4.5+ | | | | | 21 | | |
| | | | - hard above 1' | | | 2.0 | | | | | 27 | | |
| | | | | | | 1.75 | | | | | 27 | | |
| | | | | | | 2.0 | | | | | 26 | 98 | 2340 |
| 5 | | | - w/ calcareous nodules below 4' | | | 1.75 | | 76 | 19 | 57 | 27 | | |
| | | | **SILTY CLAY**, light brown, w/ weathered limestone seams, firm | | | 1.25 | | | | | 11 | 106 | |
| 10 | | | **LIMESTONE**, tan, w/ clay seams, moderately hard | | | 100/3.875" | | | | | | | |
| | | | | | | 100/2.75" | | | | | | | |
| 15 | | | **LIMESTONE**, tan, w/ gray limestone seams | | | | | | | | | | |
| | | | **SHALE**, gray, w/ gray limestone seams, moderately hard | | | 100/2.5" | | | | | | | |
| 20 | | | | | | | | | | | | | |
| | | | | | | 100/2.5" | | | | | | | |
| 25 | | | | | | | | | | | | | |
| | | | | | | 100/2.25" | | | | | | | |
| 30 | | | | | | | | | | | | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

LOG OF BORING NO. **B-8**

**PLATE A.11**

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-9 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 30.0' | 5-24-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ ironstone nodules, stiff to very stiff | | | 4.0 | | | | | 22 | | |
| | | | | | | 3.5 | | | | | 22 | | |
| | | | | | | 2.5 | | | | | 24 | | |
| | | | | | | 2.5 | | | | | 25 | 100 | 2520 |
| | | | **CLAY / SILTY CLAY**, light brown, w/ limestone fragments, ironstone nodules, and calcareous nodules, stiff | | | 2.25 | | | | | 25 | | |
| 5 | | | | | | | | | | | | | |
| | | | | | | 2.25 | | 51 | 16 | 35 | 24 | 100 | |
| | | | **LIMESTONE**, tan, w/ clay seams, moderately hard to hard | | | | | | | | | | |
| 10 | | | | | | 100/2.75" | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 15 | | | | | | 100/1.5" | | | | | | | |
| | | | **SHALE**, gray, hard to very hard | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 20 | | | | | | 100/1.25" | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 25 | | | | | | 100/0.75" | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 30 | | | | | | 100/1.25" | | | | | | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-10 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 30.0' | 5-20-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ ironstone nodules and calcareous nodules, stiff to very stiff | | | 4.25 | | | | | 21 | | |
| | | | - soft, 1' to 2' | | | 0.75 | | | | | 27 | 93 | 1690 |
| | | | | | | 2.0 | | | | | 27 | | |
| | | | - hard below 4' | | | 2.5 | | | | | 24 | | |
| | | | | | | 4.5+ | | 79 | 19 | 60 | 20 | | |
| 5 | | | **SHALY CLAY**, brown and gray, w/ ironstone nodules and calcareous nodules, hard | | | | | | | | | | |
| | | | | | | 4.5+ | | | | | 19 | | |
| | | | | | | 4.5+ | | | | | 20 | | |
| 10 | | | | | | | | | | | | | |
| | | | **LIMESTONE**, tan, weathered, moderately hard | | | 100/3.5" | | | | | | | |
| 15 | | | | | | | | | | | | | |
| | | | **LIMESTONE**, gray, hard | | | 100/1.75" | | | | | | | |
| 20 | | | | | | | | | | | | | |
| | | | | | | 100/1.75" | | | | | | | |
| 25 | | | | | | | | | | | | | |
| | | | | | | 100/1.5" | | | | | | | |
| 30 | | | | | | | | | | | | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-11 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 30.0' | 5-20-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ limestone fragments, ironstone nodules, and calcareous nodules, hard | | | 4.5+ | | | | | 20 | | |
| | | | **LIMESTONE**, tan, fractured | | | | | | | | | | |
| | | | **CLAY**, light brown, w/ ironstone nodules and calcareous nodules, stiff | | | 2.0 | | | | | 22 | | |
| | | | | | | 4.5+ | | | | | 20 | | |
| 5 | | | - grades brown, hard below 4' | | | | | | | | | | |
| | | | **SHALY CLAY**, brown and gray, w/ ironstone nodules and calcareous nodules, slickensided, hard | | | 4.5+ | | | | | 21 | 110 | 12100 |
| | | | | | | 4.5+ | | 69 | 22 | 47 | 19 | 111 | |
| 10 | | | | | | | | | | | | | |
| | | | | | | 4.5+ | | | | | 19 | | |
| 15 | | | **LIMESTONE**, tan | | | | | | | | | | |
| | | | **LIMESTONE**, gray, w/ gray shale seams, moderately hard to hard | | | | | | | | | | |
| | | | | | | 100/2" | | | | | | | |
| 20 | | | | | | | | | | | | | |
| | | | | | | 100/1.75" | | | | | | | |
| 25 | | | | | | | | | | | | | |
| | | | | | | 100/1.75" | | | | | | | |
| 30 | | | | | | | | | | | | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

LOG OF BORING NO. **B-11**

**PLATE A.14**

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-12 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 30.0' | 5-24-24 |

Surface Elevation

Type: ATV-47, w/ CFA

## Stratum Description

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ fractured tan limestone seams, ironstone nodules, and calcareous nodules, hard | | | 4.5 | | | | | 19 | | |
| | | | **CLAY**, brown and gray, w/ ironstone nodules and calcareous nodules, stiff | | | 2.25 | | | | | 18 | 110 | 2890 |
| | | | | | | 4.5+ | | 80 | 20 | 60 | 19 | | |
| 5 | | | - hard below 4' | | | | | | | | | | |
| | | | **SHALY CLAY**, brown and gray, w/ iron seams, ironstone nodules, and calcareous nodules, hard | | | 4.5+ | | | | | 19 | | |
| | | | | | | 4.5+ | | | | | 20 | | |
| 10 | | | | | | | | | | | | | |
| | | | | | | 4.5+ | | | | | 20 | | |
| 15 | | | | | | | | | | | | | |
| | | | **LIMESTONE**, gray, w/ gray shale seams, hard | | | 100/1.75" | | | | | | | |
| 20 | | | | | | | | | | | | | |
| | | | | | | 100/1.5" | | | | | | | |
| 25 | | | | | | | | | | | | | |
| | | | | | | 100/1.25" | | | | | | | |
| 30 | | | | | | | | | | | | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-13 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 25.0' | 5-22-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **SILTY CLAY**, dark brown, w/ ironstone nodules and calcareous nodules, very stiff | | | 3.5 | | | | | 23 | | |
| | | | | | | 4.5+ | | | | | 20 | | |
| | | | **SHALY CLAY**, brown and gray, w/ ironstone nodules and calcareous nodules, very stiff to hard | | | 4.5+ | | 68 | 17 | 51 | 16 | | |
| | | | | | | 4.0 | | | | | 18 | | |
| | | | | | | 3.5 | | | | | 23 | | |
| 5 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 3.25 | | | | | 23 | | |
| | | | | | | | | | | | | | |
| | | | | | | 3.5 | | | | | 23 | | |
| 10 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | **LIMESTONE**, tan, hard | | | | | | | | | | |
| | | | | | | 100/1.75" | | | | | | | |
| 15 | | | **LIMESTONE**, gray, hard to very hard | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 20 | | | | | | 100/1.25" | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | - w/ gray shale seams and layers below 22' | | | | | | | | | | |
| | | | | | | | | | | | | | |
| 25 | | | | | | 100/0.75" | | | | | | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

LOG OF BORING NO. **B-13**

**PLATE A.16**

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-14 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 30.0' | 5-22-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ ironstone nodules, calcareous nodules, and gravel, hard | | | 4.5+ | | | | | 26 | | |
| | | | | | | 4.5+ | | | | | 12 | | |
| | | | **LIMESTONE**, tan, fractured | | | | | | | | | | |
| | | | **SHALY CLAY**, brown and gray, w/ ironstone nodules, calcareous nodules, and calcareous deposits, slickensided, stiff | | | 2.25 | | | | | 18 | | |
| | | | | | | 2.75 | | | | | 20 | 108 | 4840 |
| 5 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | - very stiff to hard below 9' | | | 4.5+ | | | | | 22 | | |
| | | | | | | | | | | | | | |
| | | | | | | 4.25 | | 77 | 22 | 55 | 21 | 105 | |
| 10 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 4.5+ | | | | | 21 | | |
| 15 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | **LIMESTONE**, gray, hard to very hard | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 100/0.75" | | | | | | | |
| 20 | | | | | | | | | | | | | |
| | | | - w/ gray shale seams and layers below 21' | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 100/1.25" | | | | | | | |
| 25 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | | | 100/1.25" | | | | | | | |
| 30 | | | | | | | | | | | | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

LOG OF BORING NO. **B-14**

**PLATE A.17**

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-15 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 25.0' | 5-24-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ ironstone nodules and calcareous nodules, firm to stiff | | | 1.25 | | | | | 30 | | |
| | | | | | | 1.25 | | | | | 30 | | |
| | | | - very stiff, 2' to 3' | | | 3.5 | | | | | 22 | | |
| | | | - grades brown below 3' | | | 1.5 | | | | | 27 | | |
| | | | **SHALY CLAY**, brown and gray, w/ iron seams, ironstone nodules, and calcareous nodules, hard | | | 4.5+ | | 64 | 20 | 44 | 21 | | |
| 5 | | | | | | | | | | | | | |
| | | | | | | 4.5+ | | | | | 21 | | |
| | | | | | | | | | | | | | |
| | | | | | | 4.5+ | | | | | 20 | | |
| 10 | | | | | | | | | | | | | |
| | | | **LIMESTONE**, tan | | | | | | | | | | |
| | | | **LIMESTONE**, gray, w/ gray shale seams, moderately hard to hard | | | 100/2" | | | | | | | |
| 15 | | | | | | | | | | | | | |
| | | | | | | 100/1.25" | | | | | | | |
| 20 | | | | | | | | | | | | | |
| | | | | | | 100/1.5" | | | | | | | |
| 25 | | | | | | | | | | | | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

LOG OF BORING NO. **B-15**

**PLATE A.18**

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-16 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 5.0' | 5-24-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ ironstone nodules and calcareous nodules, soft to firm | | | 1.25 | | 65 | 23 | 42 | 29 | | |
| | | | | | | | | | | | | | |
| | | | | | | 0.75 | | | | | 32 | | |
| | | | | | | | | | | | | | |
| 5 | | | - grades brown, stiff below 4' | | | 2.5 | | | | | 27 | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

LOG OF BORING NO. **B-16** **PLATE A.19**

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-17 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 5.0' | 5-24-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ ironstone nodules and calcareous nodules, very stiff to hard | | | 4.0 | | 70 | 23 | 47 | 25 | | |
| | | | - grades brown below 2' | | | 4.5+ | | | | | 27 | | |
| 5 | | | | | | 4.25 | | | | | 23 | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

LOG OF BORING NO. **B-17**

**PLATE A.20**

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-18 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 5.0' | 5-24-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, brown, w/ ironstone nodules and calcareous nodules, stiff | | | 1.75 | | 60 | 22 | 38 | 27 | | |
| | | | - grades light brown, w/ calcareous deposits, hard below 2' | | | 4.5+ | | | | | 15 | | |
| 5 | | | **LIMESTONE**, tan, moderately hard | | | 100/3" | | | | | | | |

LOG OF BORING NO. **B-18**

**PLATE A.21**

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-19 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 5.0' | 5-24-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown, w/ ironstone nodules and calcareous nodules, stiff | | | 2.5 | | 61 | 22 | 39 | 32 | | |
| | | | | | | 2.25 | | | | | 29 | | |
| | | | | | | 1.75 | | | | | 18 | | |
| | | | **LIMESTONE**, tan, fractured | | | | | | | | | | |
| 5 | | | **SHALY CLAY**, brown and gray, w/ ironstone nodules and calcareous nodules, hard | | | 4.5+ | | | | | 19 | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

LOG OF BORING NO. **B-19**

**PLATE A.22**

CMJ ENGINEERING INC.

| Project No. | Boring No. | Project |
|---|---|---|
| 398-24-24 | B-20 | St. Teresa of Calcutta Parish<br>13717 Alta Vista Road - Fort Worth, Texas |

| Location | Water Observations |
|---|---|
| See Plate A.1 | Dry during drilling; dry at completion |

| Completion Depth | Completion Date |
|---|---|
| 5.0' | 5-20-24 |

Surface Elevation

Type: ATV-47, w/ CFA

| Depth, Ft. | Symbol | Samples | Stratum Description | REC % | RQD % | Blows/Ft. or Pen Reading, T.S.F. | Passing No 200 Sieve, % | Liquid Limit, % | Plastic Limit, % | Plasticity Index | Moisture Content, % | Unit Dry Wt. Lbs./Cu. Ft. | Unconfined Compression Pounds/Sq. Ft. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | **CLAY**, dark brown and brown, w/ iron stains, ironstone nodules, and calcareous nodules, very stiff to hard | | | 3.75 | | 60 | 18 | 42 | 19 | | |
| | | | | | | 4.5+ | | | | | 11 | | |
| | | | **SILTY SHALY CLAY**, light brown, w/ iron stains, ironstone nodules, calcareous nodules, and occasional calcareous deposits, firm | | | 1.25 | | | | | 20 | | |
| | | | | | | 4.5+ | | | | | 13 | | |
| 5 | | | - hard below 3' | | | 4.5+ | | | | | 13 | | |

LOG OF BORING 398-24-24-1.GPJ CMJ.GDT 6/21/24

LOG OF BORING NO. **B-20**

**PLATE A.23**

# FREE SWELL TEST RESULTS

Project: St. Teresa of Calcutta Parish
13717 Alta Vista Road – Fort Worth, Texas

Project No.: 398-24-24

| Boring No. | Depth Interval (ft.) | Sample Description | Liquid Limit | Plastic Limit | Plasticity Index | Moisture Content % | | Percent Swell (%) |
|---|---|---|---|---|---|---|---|---|
| | | | LL | PL | PI | Initial | Final | |
| B-1 | 7 – 8 | Clay | 65 | 20 | 45 | 19.7 | 25.0 | 5.5 |
| B-3 | 7 – 8 | Shaly Clay | 77 | 21 | 56 | 19.7 | 26.1 | 8.2 |
| B-6 | 9 – 10 | Shaly Clay | 67 | 21 | 46 | 17.9 | 23.6 | 6.5 |
| B-7 | 3 – 4 | Silty Shaly Clay | 37 | 16 | 21 | 17.7 | 22.8 | 1.6 |
| B-9 | 7 – 8 | Clay / Silty Clay | 51 | 16 | 35 | 23.8 | 25.9 | 0.3 |
| B-11 | 9 – 10 | Shaly Clay | 69 | 22 | 47 | 18.6 | 24.2 | 6.8 |
| B-14 | 9 – 10 | Shaly Clay | 77 | 22 | 55 | 21.3 | 25.5 | 4.8 |

Free swell tests performed at approximate overburden pressure

# SOLUBLE SULFATE TEST RESULTS

Project: St. Teresa of Calcutta Parish
13717 Alta Vista Road – Fort Worth, Texas

Project No.: 398-24-24

| Boring No. | Depth (ft.) | Material | Soluble Sulfates (ppm) |
|---|---|---|---|
| B-16 | 0 – 2 | Clay | <100 |
| B-17 | 0 – 2 | Clay | <100 |
| B-18 | 0 – 2 | Clay | 11,840 |
| B-19 | 0 – 1 | Clay | <100 |
| B-20 | 0 – 1 | Clay | <100 |

Note: Test Method TxDOT Tex 145-E.

**SECTION 00410 - BID FORM**

**CHURCH: SAINT TERESA CATHOLIC CHURCH**
**13517 ALTA VISTA ROAD**
**FORT WORTH, TEXAS 76262**

**PROJECT: PARISH HALL**

Date:_____

Submitted by: ( Bidder to enter date )

Firm Name _____

Address _____

City, State, Zip _____

Submitted by _____
Signature Date

The undersigned, having visited the site and examined the Bid Documents and Specifications entitled St. Teresa Catholic Church, Parish Hall, dated : August 5, 2024, as prepared by Scott A. Martsolf, Architect, Inc.,815 West Daggett, Fort Worth, Texas,76104, propose to furnish all materials, labor, and supervision required to complete the Work as set forth in the above mentioned documents for the GMP.
of_____

($_____)

Alternate No. 1: ($_____)

Alternate No. 2: ($_____)

Please provide Itemized Cost Estimate to support proposed GMP.

**The undersigned proposes to commence construction no later than _____ days after receipt of signed Owner –Contractor Agreement and complete the Work in _____ calendar days or less.**

**The undersigned acknowledges receipt of the following addenda:**

Addenda No._____ Dated_____
Addenda No._____ Dated_____
Addenda No._____ Dated_____
Addenda No._____ Dated_____
Addenda No._____ Dated_____

For Change Orders adding to the Contract Sum the undersigned will add ___% for overhead & profit.

For Change Orders reducing the contract Sum the undersigned will credit ___% for overhead & profit.

## UNIT PRICING

For changing quantities of work items from those indicated, the following unit pricing prevail. These unit prices include all charges for labor, material, layout, fee, supervision, general administration expenses, insurance, overhead and profit.

## DESCRIPTION

Drilled Piers: Per linear foot, for depths greater or less than those shown on drawings, including drilling, casing, reinforcing and concrete.

| SIZE | EXTRA | CREDIT |
|---|---|---|
| 18” dia. | $ | $ |
| 24” dia. | $ | $ |

**END OF BID FORM - 00410**

**SECTION 01100**

**SUMMARY**

## PART 1 - GENERAL

### 1.01 PROJECT

A. Project Name**: ST. TERESA OF CALCUTTA CATHOLIC CHURCH, PARISH HALL**

Architect's Name: Scott A. Martsolf, Architect, Inc.
815 West Daggett Avenue
Fort Worth, Texas 76104

**Owner: Michael F. Olson S.T.D, Bishop of the Catholic Diocese of Fort Worth**
**800 West Loop 820 South**
**Fort Worth, Texas 76108**

### 1.02 CONTRACT DESCRIPTION

**A. Contract Type: A single prime contract, AIA Document A101, 2017 Edition with AIA ( MODIFIED ) Document A201 General Conditions.** ( see attached exhibit )

## PART 2 - PRODUCTS - NOT USED

## PART 3 - EXECUTION - NOT USED

**END OF SECTION**

# SECTION 01200

# PRICE AND PAYMENT PROCEDURES

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Documentation of changes in Contract Sum and Contract Time.

B. Change procedures.

C. Correlation of Contractor submittals based on changes.

D. Procedures for preparation and submittal of application for final payment.

### 1.02 RELATED SECTIONS

A. Standard Form of Agreement Between Owner and Contractor.

### 1.03 SCHEDULE OF VALUES

A. Submit Schedule of Values in duplicate within 15 days after date of Owner-Contractor Agreement.

B. Format: Utilize the Table of Contents of this Project Manual. Identify each line item with number and title of the specification Section. Identify site mobilization.

C. Include separately from each line item, a direct proportional amount of Contractor's overhead and profit.

D. Revise schedule to list approved Change Orders, with each Application for Payment.

### 1.04 APPLICATIONS FOR PROGRESS PAYMENTS

A. For each item, provide a column for listing each of the following:
   1. Item Number.
   2. Description of work.
   3. Scheduled Values.
   4. Previous Applications.
   5. Work in Place and Stored Materials under this Application.
   6. Authorized Change Orders.
   7. Total Completed and Stored to Date of Application.
   8. Percentage of Completion.
   9. Balance to Finish.
   10. Retainage.

B. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored Products.

C. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of Work.

D. Include the following with the application:
   1. Transmittal letter as specified for Submittals in Section 01300.
   2. Construction progress schedule, revised and current as specified in Section 01300.
   3. Partial release of liens from major Subcontractors and vendors.
   4. Project record documents as specified in Section 01780, for review by Owner which will be returned to the Contractor.

E. When Architect requires substantiating information, submit data justifying dollar amounts in question. Provide one copy of data with cover letter for each copy of submittal. Show application number and date, and line item by number and description.

### 1.05 MODIFICATION PROCEDURES

A. Submit name of the individual authorized to receive change documents and who will be responsible for informing others in Contractor's employ or Subcontractors of changes to the Work.

B. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the Work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation and a statement describing the effect on Work by separate or other contractors. Document any requested substitutions in accordance with Section 01600.

C. Computation of Change in Contract Amount:
   1. For change requested by Architect for work falling under a fixed price contract, the amount will be based on Contractor's price quotation.
   2. For change requested by Contractor, the amount will be based on the Contractor's request for a Change Order as approved by Architect.
   3. For change ordered by Architect without a quotation from Contractor, the amount will be determined by Architect based on the Contractor's substantiation of costs as specified for Time and Material work.

D. Substantiation of Costs: Provide full information required for evaluation.
   1. On request, provide following data:
      a. Quantities of products, labor, and equipment.
      b. Taxes, insurance, and bonds.
      c. Overhead and profit.
      d. Justification for any change in Contract Time.
      e. Credit for deletions from Contract, similarly documented.
   2. Support each claim for additional costs with additional information:
      a. Origin and date of claim.
      b. Dates and times work was performed, and by whom.
      c. Time records and wage rates paid.
      d. Invoices and receipts for products, equipment, and subcontracts, similarly documented.

E. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.

F. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.

G. Promptly enter changes in Project Record Documents.

### 1.06 APPLICATION FOR FINAL PAYMENT

A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.

B. Application for Final Payment will not be considered until the following have been accomplished:
   1. All closeout procedures specified in Section 01700.

## PART 2 - PRODUCTS - NOT USED

## PART 3 - EXECUTION - NOT USED

**END OF SECTION**

# SECTION 01210

# ALLOWANCES

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Cash allowances.

### 1.03 CASH ALLOWANCES

A. Costs Included in Cash Allowances: Product delivery to site and handling at the site, including unloading, uncrating, and storage; protection of products from elements and from damage; and labor for installation and finishing.

B. Architect Responsibilities:
   1. Consult with Contractor for consideration and selection of products, suppliers, and installers.
   2. Select products in consultation with Owner and transmit decision to Contractor.
   3. Prepare Change Order.

C. Contractor Responsibilities:
   1. Assist Architect in selection of products, suppliers, and installers.
   2. Obtain proposals from suppliers and installers and offer recommendations.
   3. On notification of which products have been selected, execute purchase agreement with designated supplier and installer.
   4. Arrange for and process shop drawings, product data, and samples. Arrange for delivery.
   5. Promptly inspect products upon delivery for completeness, damage, and defects. Submit claims for transportation damage.

D. Differences in costs will be adjusted by Change Order.

### 1.04 ALLOWANCES SCHEDULE

**A. $30,000 allowance for the door hardware in Section 08710 – Hardware Schedule.**

## PART 2 PRODUCTS - NOT USED

## PART 3 EXECUTION - NOT USED

**END OF SECTION**

# SECTION 01230

# ALTERNATIVES

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Alternative submission procedures.

B. Documentation of changes to Contract Sum and Contract Time.

### 1.02 RELATED SECTIONS

A. Section 00500 - Agreement.

### 1.03 ACCEPTANCE OF ALTERNATIVES

A. Alternatives quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted alternatives will be identified in the Owner-Contractor Agreement.

B. Accepted alternatives will be identified in the Owner – Contractor Agreement.

C. Coordinate related work and modify surrounding work to integrate the Work of each alternative.

### 1.04 SCHEDULE OF ALTERNATIVES

A. The list below is intended to make the Contractor aware of the alternates contained in the bid package. The scope of work for the alternates are described in detail on the drawings.

1. **<u>Alternate Number One:</u> ADD EAST AND WEST BUILDING WINGS AS INDICATED ON PLAN A2.1A**

2. **<u>Alternate Number Two:</u> ADD ADDITIONAL CONCRTETE PARKING AS SHOWN ON CIVIL PLAN C3.0 . NOTE: ALL CONCRETE SIDEWALKS TO BE INCUDED IN THE BASE BID.**

## PART 2 - PRODUCTS - NOT USED

## PART 3 - EXECUTION - NOT USED

**END OF SECTION**

**SECTION 01270**

**UNIT PRICNG**

## PART 1 - GENERAL

### 1.01 SUMMARY

A. Sections Includes:

1. Measurements

2. Payment.

B. Related Sections:

1. Individual specification sections

### 1.02 UNIT PRICES

A. Provide unit prices for items listed, for inclusion Contract, guaranteed to apply for duration of Project as basis for additions to or deductions from Contract Summary.

B. Take measurements and compute quantities.

C. Quantities and measurements indicated are for Contract purposes only. Actual quantities and measurements supplied or placed in the Work will determine payment.

D. Payment includes full compensation for all required labor, Products, tools, plant, transportation, services, and incidentals, and erection, application, or installation of an item of the Work.

E. Adjustments to Contract Sum will be made by Change Order based on net cumulative change for each item of the Work

## PART 2 – PRODUCTS - NOT USED

## PART 3 - EXECUTION

### 3.01 UNIT PRICE SCHEDULE

A. Drilled Concrete Piers:

1. Pier Depth

a. Unit of measure: By the linear foot shaft drilling, dewatering, reinforcement, and concrete.

b. Basis of Payment:

1) Contract Sum to be based on design depths indicated on Drawings.

2) Adjustments to Contract Sum will be made using actual pier depth measured from top of piers to the top of bearing strata. Payment for penetration into bearing strata is not included in unit price, and is to be included in Contract Sum.

2. Temporary Casing

a. Unit of measure: By linear foot including placement and removal.

**END OF SECTION**

**SECTION 01300**

# ADMINISTRATIVE REQUIREMENTS

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Preconstruction meeting.

B. Progress meetings.

C. Construction progress schedule.

D. Coordination drawings.

E. Submittals for review, information, and project closeout.

F. Number of copies of submittals.

G. Submittal procedures.

### 1.02 RELATED SECTIONS

A. Section 05500 - Agreement.

B. Section 01700 - Execution Requirements: Additional coordination requirements.

C. Section 01780 - Closeout Submittals: Project record documents.

### 1.03 PROJECT COORDINATION

A. Cooperate with the Owner in allocation of mobilization areas of site; for field offices and sheds, for access, traffic, and parking facilities.

B. Make the following types of submittals to Architect:
1. Requests for interpretation.
2. Requests for substitution.
3. Shop drawings, product data, and samples.
4. Test and inspection reports.
5. Manufacturer's instructions and field reports.
6. Applications for payment and change order requests.
7. Progress schedules.
8. Coordination drawings.
9. Closeout submittals.

## PART 2 – PRODUCTS - NOT USED

## PART 3 - EXECUTION

### 3.01 PRECONSTRUCTION MEETING

A. Contractor will schedule a meeting after Notice of Award.

B. Attendance Required:
1. Owner.
2. Architect.
3. Contractor.

C. Agenda:
1. Execution of Owner-Contractor Agreement.
2. Submission of executed bonds and insurance certificates.
3. Distribution of Contract Documents.
4. Submission of list of Subcontractors, list of Products, schedule of values, and progress schedule.
5. Designation of personnel representing the parties to Contract, and Architect.
6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.

7. Scheduling.
8. Use of premises by Owner and Contractor.
9. Owner's requirements and occupancy prior to completion.
10. Construction facilities and controls provided by Owner.
11. Temporary utilities provided by Owner.
12. Survey and building layout.
13. Security and housekeeping procedures.
14. Schedules.
15. Application for payment procedures.
16. Procedures for testing.
17. Procedures for maintaining record documents.
18. Requirements for start-up of equipment.
19. Inspection and acceptance of equipment put into service during construction period.

D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

**3.02 PROGRESS MEETINGS**

A. Schedule and administer meetings throughout progress of the Work at maximum monthly intervals.

B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.

C. Attendance Required: Job superintendent, major Subcontractors and suppliers, Owner, Architect, as appropriate to agenda topics for each meeting.

D. Agenda:
1. Review minutes of previous meetings.
2. Review of Work progress.
3. Field observations, problems, and decisions.
4. Identification of problems which impede planned progress.
5. Review of submittals schedule and status of submittals.
6. Maintenance of progress schedule.
7. Corrective measures to regain projected schedules.
8. Planned progress during succeeding work period.
9. Maintenance of quality and work standards.
10. Effect of proposed changes on progress schedule and coordination.
11. Other business relating to Work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

**3.03 CONSTRUCTION PROGRESS SCHEDULE**

A. If preliminary schedule requires revision after review, submit revised schedule within 10 days.

B. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
1. Include written certification that major contractors have reviewed and accepted proposed schedule.

C. Within 10 days after joint review, submit complete schedule.

D. Submit updated schedule with each Application for Payment.

**3.04 SUBMITTALS FOR REVIEW**

A. When the following are specified in individual sections, submit them for review:
1. Product data.
2. Shop drawings.
3. Samples for selection.
4. Samples for verification.

B. Submit to Architect for review for the limited purpose of checking for conformance with information given and the design concept expressed in the contract documents.

C. Samples will be reviewed only for aesthetic, color, or finish selection.

D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01780 - CLOSEOUT SUBMITTALS.

### 3.05 SUBMITTALS FOR INFORMATION

A. When the following are specified in individual sections, submit them for information:
   1. Design data.
   2. Certificates.
   3. Test reports.
   4. Inspection reports.
   5. Manufacturer's instructions.
   6. Manufacturer's field reports.
   7. Other types indicated.

B. Submit for Architect's knowledge as contract administrator or for Owner. No action will be taken.

### 3.06 SUBMITTALS FOR PROJECT CLOSEOUT

A. When the following are specified in individual sections, submit them at project closeout:
   1. Project record documents.
   2. Operation and maintenance data.
   3. Warranties.
   4. Bonds.
   5. Other types as indicated.

B. Submit for Owner's benefit during and after project completion.

### 3.07 NUMBER OF COPIES OF SUBMITTALS

A. Documents for Review:
   1. Small Size Sheets, Not Larger Than 8-1/2 x 11 inches: Submit four copies; three copies will be returned to the Contractor.
   2. Larger Sheets, Not Larger Than 36 x 48 inches: Submit four copies; three copies will be returned to the Contractor.

B. Documents for Information: Submit four copies; three copies will be returned to the Contractor.

C. Documents for Project Closeout: Make one reproduction of submittal originally reviewed. Submit one extra of submittals for information.

D. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
   1. After review, produce duplicates.
   2. Retained samples will not be returned to Contractor unless specifically so stated.

### 3.08 SUBMITTAL PROCEDURES

A. Transmit each submittal with AIA Form G810 or approved cover sheet.

B. Sequentially number all submittals and use the submittal number on the transmittal form. The sequential numbering is to occur within each specification section of the project. The submittal number will consist of the submittal’s five-digit specification section number as a prefix, followed by the sequential number. Revise submittals with original number and a sequential alphabetic suffix.

C. Identify Project, Contractor, Subcontractor or supplier; pertinent drawing and detail number, and specification section number, as appropriate on each copy.

D. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of Products required, field dimensions, adjacent construction Work, and coordination of information is in accordance with the requirements of the Work and Contract Documents. Submittals will not be accepted by the Architect until after they have been thoroughly reviewed by the Contractor and stamped as such.

E. Deliver submittals to Architect at business address or electronically.

F. Schedule submittals to expedite the Project, and coordinate submission of related items.

G. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.

H. Identify variations from Contract Documents and Product or system limitations which may be detrimental to successful performance of the completed Work.

I. Provide space for Contractor and Architect review stamps.

J. When revised for resubmission, identify all changes made since previous submission.

K. Distribute copies of reviewed submittals as appropriate. Instruct parties to promptly report any inability to comply with requirements.

L. Submittals not requested will not be recognized or processed.

**END OF SECTION**

# SECTION 01400

# QUALITY REQUIREMENTS

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. References and standards.

B. Quality assurance submittals.

C. Mock-ups.

D. Control of installation.

E. Tolerances.

F. Manufacturers' field services.

### 1.02 RELATED SECTIONS

A. Standard Form of Agreement between Owner and Contractor.

B. Section 01300 - Administrative Requirements: Submittal procedures.

### 1.03 SUBMITTALS

A. Testing Agency Qualifications:
   1. Prior to start of Work, submit agency name, address, and telephone number, and names of full time registered Engineer and responsible officer.

B. Design Data: Submit for Architect's knowledge as contract administrator or for the Owner, for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

C. Test Reports: After each test/inspection, promptly submit two copies of report to Architect and to Contractor.
   1. Include:
      a. Date issued.
      b. Project title and number.
      c. Name of inspector.
      d. Date and time of sampling or inspection.
      e. Identification of product and specifications section.
      f. Location in the Project.
      g. Type of test/inspection.
      h. Date of test/inspection.
      i. Results of test/inspection.
      j. Conformance with Contract Documents.
      k. When requested by Architect, provide interpretation of results.
   2. Test reports are submitted for Architect's knowledge as contract administrator or for the Owner, for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

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

E. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

F. Manufacturer's Field Reports: Submit reports for Architect's benefit as contract administrator or for Owner.
   1. Submit report in duplicate within 30 days of observation to Architect for information.
   2. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

G. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
   1. Submit for information for the limited purpose of assessing conformance with information given and the design concept expressed in the contract documents.

### 1.04 REFERENCES AND STANDARDS

A. For products and workmanship specified by reference to a document or documents not included in the Project Manual, also referred to as reference standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. Conform to reference standard of date of issue current on date of Contract Documents, except where a specific date is established by applicable code.

C. Obtain copies of standards where required by product specification sections.

D. Maintain copy at project site during submittals, planning, and progress of the specific work, until Substantial Completion.

E. Should specified reference standards conflict with Contract Documents, request clarification from Architect before proceeding.

F. Neither the contractual relationships, duties, or responsibilities of the parties in Contract nor those of Architect shall be altered from the Contract Documents by mention or inference otherwise in any reference document.

### 1.05 TESTING AND INSPECTION AGENCIES

A. Owner will employ and pay for services of an independent testing agency to perform specified testing.

B. As indicated in individual specification sections, Owner or Contractor shall employ and pay for services of an independent testing agency to perform testing required by initial failures of installed products or materials.

C. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.

## PART 2 – PRODUCTS - NOT USED

## PART 3 - EXECUTION

### 3.01 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 manufacturers' instructions, including each step in sequence.

C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect 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. Have Work performed by persons qualified to produce required and specified quality.

F. Verify that 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, and disfigurement.

### 3.02 MOCK-UPS

A. Tests will be performed under provisions identified in this section and identified in the respective product specification sections.

B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.

C. Accepted mock-ups shall be a comparison standard for the remaining Work.

D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, remove mock-up and clear area when directed to do so.

### 3.03 TOLERANCES

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

B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.

C. Adjust products to appropriate dimensions; position before securing products in place.

### 3.04 TESTING AND INSPECTION

A. See individual specification sections for testing required.

B. Testing Agency Duties:
   1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
   2. Perform specified sampling and testing of products in accordance with specified standards.
   3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   4. Promptly notify Architect and Contractor of observed irregularities or non-conformance of Work or products.
   5. Perform additional tests and inspections required by Architect.
   6. Submit reports of all tests/inspections specified.

C. Limits on Testing/Inspection Agency Authority:
   1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
   2. Agency may not approve or accept any portion of the Work.
   3. Agency may not assume any duties of Contractor.
   4. Agency has no authority to stop the Work.

D. Contractor Responsibilities:
   1. Deliver to agency at designated location, adequate samples of materials proposed to be used which require testing, along with proposed mix designs.
   2. Cooperate with laboratory personnel, and provide access to the Work.
   3. Provide incidental labor and facilities:
      a. To provide access to Work to be tested/inspected.
      b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
      c. To facilitate tests/inspections.
      d. To provide storage and curing of test samples.
   4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
   5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
   6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

E. Re-testing required because of non-conformance to specified requirements shall be performed by the same agency on instructions by Architect. Payment for re testing will be charged to the Contractor by deducting testing charges from the Contract Price.

**3.05 MANUFACTURERS' 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. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

**3.06 DEFECT ASSESSMENT**

A. Replace Work or portions of the Work not conforming to specified requirements.

B. If, in the opinion of Architect, it is not practical to remove and replace the Work, Architect will direct an appropriate remedy or adjust payment.

**END OF SECTION**

# SECTION 01410

# APPROVAL MOCK-UP

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Approval Mock-ups.

B. Inspection.

## PART 3 - EXECUTION

### 3.01 MOCK-UPS

A. EFIS : Color & Texture - Assemble and erect 4’ X 4’ Mock-UP

B. Thin-set Stone: Stone and mortar joints - Assemble and erect 4’ X 4’ Mock-Up

B. Stained concrete floor sample – Show stain colors and sealing

C. Accepted mock-ups shall be a comparison standard for the remaining Work.

### 3.02 CONTRACTOR DUTIES

A. Contractor Responsibilities:
   1. Cooperate with Architect and Owner in construction of mock-ups.
   2. Ascertain compliance of materials and mixes with requirements of Contract Documents.
   3. Promptly notify Architect and Owner when mock-up is ready for inspection.
   4. Perform additional work required to secure approval of mock-up prior to erection of any materials contained in the mock-up.

### 3.03 DEFECT ASSESSMENT

A. Replace portions of the mock-up not conforming to specified requirements. Replace components of the mock-up under the written direction of the Architect.

**END OF SECTION**

# SECTION 01500

# TEMPORARY FACILITIES AND CONTROLS

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Temporary utilities.

B. Temporary sanitary facilities.

C. Temporary Controls: Barriers, enclosures, and fencing.

D. Vehicular access and parking.

E. Waste removal facilities and services.

F. Project identification sign.

### 1.02 TEMPORARY UTILITIES

A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.

B. New permanent facilities may be used.

C. Use trigger-operated nozzles for water hoses, to avoid waste of water.

### 1.03 TELEPHONE SERVICE

A. Provide, maintain, and pay for telephone service to field office at time of project mobilization.

### 1.04 TEMPORARY SANITARY FACILITIES

A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.

B. Maintain daily in clean and sanitary condition.

### 1.05 BARRIERS

A. Provide barriers to prevent unauthorized entry to construction areas, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.

B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.

C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

### 1.06 EXTERIOR ENCLOSURES

A. Provide temporary insulated weather tight closure of exterior openings to accommodate acceptable working conditions and protection for Products, to allow for temporary heating and maintenance of required ambient temperatures identified in individual specification sections, and to prevent entry of unauthorized persons. Provide access doors with self-closing hardware and locks.

### 1.07 VEHICULAR ACCESS AND PARKING

A. Coordinate access and haul routes with governing authorities and Owner.

B. Provide and maintain access to fire hydrants, free of obstructions.

C. Provide means of removing mud from vehicle wheels before entering streets.

D. Existing parking areas designated by Owner may be used for construction parking.

### 1.08 WASTE REMOVAL

A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.

B. Provide containers with lids. Remove trash from site periodically.

C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.

D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

### 1.10 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS

A. Remove temporary utilities, equipment, facilities, and materials prior to Substantial Completion inspection.

B. Remove underground installations to a minimum depth of 2 feet.

C. Clean and repair damage caused by installation or use of temporary work.

D. Restore existing facilities used during construction to original condition.

E. Restore new permanent facilities used during construction to specified condition.

## PART 2 - PRODUCTS - NOT USED

## PART 3 - EXECUTION - NOT USED

**END OF SECTION**

# SECTION 01600

# PRODUCT REQUIREMENTS

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. General product requirements.

B. Re-use of existing products.

C. Transportation, handling, storage and protection.

D. Product option requirements.

E. Substitution limitations and procedures.

F. Procedures for Owner-supplied products.

G. Spare parts and maintenance materials.

### 1.02 RELATED SECTIONS

A. Section 01400 - Quality Requirements: Product quality monitoring.

### 1.03 REFERENCES

A. NFPA 70 - National Electrical Code; National Fire Protection Association; 2002.

### 1.04 SUBMITTALS

A. Proposed Products List: Submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.
   1. Submit within 15 days after date of Agreement.
   2. For products specified only by reference standards, list applicable reference standards.

B. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.

C. Shop Drawing Submittals: Prepared specifically for this Project.

D. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
   1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

E. Indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.

## PART 2 - PRODUCTS

### 2.01 NEW PRODUCTS

A. Provide new products unless specifically required or permitted by the Contract Documents.

B. Do not use products having any of the following characteristics:
   1. Made using or containing CFC's or HCFC's.

C. Provide interchangeable components of the same manufacture for components being replaced.

D. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Size terminal lugs to NFPA 70, include lugs for terminal box.

E. Cord and Plug: Provide minimum 6-foot cord and plug including grounding connector for connection to electric wiring system. Cord of longer length is specified in individual specification sections.

### 2.02 PRODUCT OPTIONS

A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.

B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named. Utilize Substitution Request Forms included in the Project Manual.

### 2.03 SPARE PARTS AND MAINTENANCE PRODUCTS

A. Provide spare parts, maintenance, and extra products of types and in quantities specified in individual specification sections.

B. Deliver to Project site; obtain receipt prior to final payment.

## PART 3 - EXECUTION

### 3.01 SUBSTITUTION PROCEDURES

A. The request form specifies the time restrictions for submitting requests for substitutions during the bidding period. Comply with requirements specified in this section.

B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents.

C. A request for substitution constitutes a representation that the submitter:
   1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product.
   2. Will provide the same warranty for the substitution as for the specified product.
   3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.
   4. Waives claims for additional costs or time extension which may subsequently become apparent.

D. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals, without separate written request, or when acceptance will require revision to the Contract Documents.

E. Substitution Submittal Procedure:
   1. Utilize Substitution Request Forms included in the Project Manual. Submit three copies of request for substitution for consideration. Limit each request to one proposed substitution.
   2. Submit shop drawings, product data, and certified test results attesting to the proposed product equivalence. Burden of proof is on the proposer.
   3. The Architect will notify Contractor in writing of decision to accept or reject request.

### 3.02 OWNER-SUPPLIED PRODUCTS

A. Owner's Responsibilities:
   1. Arrange for and deliver Owner reviewed shop drawings, product data, and samples, to Contractor.
   2. Arrange and pay for product delivery to site.
   3. On delivery, inspect products jointly with Contractor.
   4. Submit claims for transportation damage and replace damaged, defective, or deficient items.
   5. Arrange for manufacturers' warranties, inspections, and service.

B. Contractor's Responsibilities:
   1. Review Owner reviewed shop drawings, product data, and samples.
   2. Receive and unload products at site; inspect for completeness or damage jointly with Owner.
   3. Handle, store, install and finish products.
   4. Repair or replace items damaged after receipt.

### 3.03 TRANSPORTATION AND HANDLING

A. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.

B. Transport and handle products in accordance with manufacturer's instructions.

C. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.

D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

E. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage.

F. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

### 3.04 STORAGE AND PROTECTION

A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication.

B. Store and protect products in accordance with manufacturers' instructions.

C. Store with seals and labels intact and legible.

D. Store sensitive products in weather tight, climate controlled, enclosures in an environment favorable to product.

E. For exterior storage of fabricated products, place on sloped supports above ground.

F. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.

G. Prevent contact with material that may cause corrosion, discoloration, or staining.

H. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

I. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**END OF SECTION**

# *PRODUCT SUBSTITUTION REQUEST FORM*

(During the Bidding Phase – Must be submitted a minimum of 5 days before the bid date)

Project: _____ Substitution Request No: _____

_____ From: _____

To: _____ Date: _____

_____ A/E Project No: _____

Reference: _____ Contract For: _____

Specification Title: _____

Section: _____ Page: _____ Article / Paragraph: _____

Proposed Substitution: _____

Manufacturer: _____ Address: _____

Telephone: _____ Proposed Model No.: _____

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

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

The undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by substitution.

Submitted By: _____ Signed :_____

Firm: _____ Address: _____

Phone: _____ _____

A/E's REVIEW & ACTION

☐ Substitution approved – Make submittals in accordance with Project Manual requirements.
☐ Substitution approved as noted – Make submittals in accordance with Project Manual requirements.
☐ Substitution rejected – Use specified materials.
☐ Substitution Request received too late – Use specified materials.

A/E Signature: _____ Date: _____

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ _____

**END OF REQUEST FORM**

# SECTION 01700

# EXECUTION REQUIREMENTS

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Examination, preparation, and general installation procedures.

B. Pre-installation meetings.

C. Cutting and patching.

D. Cleaning and protection.

E. Closeout procedures, except payment procedures.

### 1.02 RELATED SECTIONS

A. Section 01100 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.

B. Section 01300 - Administrative Requirements: Submittals procedures.

C. Section 01400 – Quality Requirements: Testing and inspection procedures.

D. Section 01500 - Temporary Facilities and Controls: Temporary interior partitions.

E. Section 01780 - Closeout Submittals: Project record documents, operation and maintenance data, warranties and bonds.

### 1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Cutting and Patching: Submit written request in advance of cutting or alteration which affects:
   1. Structural integrity of any element of Project.
   2. Integrity of weather exposed or moisture resistant element.
   3. Efficiency, maintenance, or safety of any operational element.
   4. Visual qualities of sight exposed elements.
   5. Work of Owner or separate Contractor.

### 1.04 PROJECT CONDITIONS

A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.

B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere.

C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.

D. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations.

### 1.05 COORDINATION

A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.

B. Notify affected utility companies and comply with their requirements.

C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.

D. Coordinate space requirements, supports, and installation of mechanical and electrical work which are indicated diagrammatically on Drawings. Follow routing shown for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.

F. Coordinate completion and clean-up of work of separate sections.

G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

## PART 2 - PRODUCTS

### 2.01 PATCHING MATERIALS

A. New Materials: As specified in product sections; match existing products and work for patching and extending work.

B. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01600.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.

B. Examine and verify specific conditions described in individual specification sections.

C. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or mis-fabrication.

D. Verify that utility services are available, of the correct characteristics, and in the correct locations.

### 3.02 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.

### 3.03 PREINSTALLATION MEETINGS

A. When required in individual specification sections, convene a pre-installation meeting at the site prior to commencing work of the section.

B. Require attendance of parties directly affecting, or affected by, work of the specific section.

C. Notify Architect four days in advance of meeting date.

D. Prepare agenda and preside at meeting:
   1. Review conditions of examination, preparation and installation procedures.
   2. Review coordination with related work.

E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

**3.04 GENERAL INSTALLATION REQUIREMENTS**

A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.

B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.

C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.

D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.

E. Make neat transitions between different surfaces, maintaining texture and appearance.

**3.05 CUTTING AND PATCHING**

A. Execute cutting and patching including excavation and fill to complete the work, to uncover work in order to install improperly sequenced work, to remove and replace defective or non-conforming work, to remove samples of installed work for testing when requested, to provide openings in the work for penetration of mechanical and electrical work, to execute patching to complement adjacent work, and to fit products together to integrate with other work.

B. Execute work by methods to avoid damage to other work, and which will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.

C. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.

D. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.

E. Restore work with new products in accordance with requirements of Contract Documents.

F. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07840, to full thickness of the penetrated element.

H. Refinish surfaces to match adjacent finish. For continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.

I. Make neat transitions. Patch work to match adjacent work in texture and appearance. Where new work abuts or aligns with existing, perform a smooth and even transition.

J. Patch or replace surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. Repair substrate prior to patching finish. Finish patches to produce uniform finish and texture over entire area. When finish cannot be matched, refinish entire surface to nearest intersections.

### 3.06 PROGRESS CLEANING

A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.

B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.

C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

### 3.07 PROTECTION OF INSTALLED WORK

A. Protect installed work from damage by construction operations.

B. Provide special protection where specified in individual specification sections.

C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.

D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.

E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.

F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.

G. Remove protective coverings when no longer needed; reuse or recycle plastic coverings if possible.

### 3.08 ADJUSTING

A. Adjust operating products and equipment to ensure smooth and unhindered operation.

### 3.09 FINAL CLEANING

A. Execute final cleaning prior to final project assessment.

B. Use cleaning materials that are nonhazardous.

C. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.

D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.

E. Clean filters of operating equipment.

F. Remove dust from all surfaces. Remove dust from the inside of concealed spaces, including but not limited to cabinets and drawers

G. Clean debris from roofs, gutters, downspouts, and drainage systems.

H. Clean site; sweep paved areas, rake clean landscaped surfaces.

I. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

### 3.10 CLOSEOUT PROCEDURES

A. Make submittals that are required by governing or other authorities.
   1. Provide copies to Architect.
   2. Provide copies to Owner.

B. Notify Architect when work is considered ready for Substantial Completion.

C. Submit written certification that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's review.

D. Correct items of work listed in executed Certificates of Substantial Completion and comply with requirements for access to Owner-occupied areas.

E. Notify Architect when work is considered finally complete.

F. Complete items of work determined by Architect's final inspection.

**END OF SECTION**

# SECTION 01780

# CLOSEOUT SUBMITTALS

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Project Record Documents.

B. Operation and Maintenance Data.

C. Warranties and bonds.

### 1.02 RELATED SECTIONS

A. Section 01300 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.

B. Individual Product Sections: Specific requirements for operation and maintenance data, and warranties required for specific products or Work.

### 1.03 SUBMITTALS

A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.

B. Operation and Maintenance Data:
1. Submit two copies of preliminary draft or proposed formats and outlines of contents before start of Work. Architect will review draft and return one copy with comments.
2. For equipment, or component parts of equipment put into service during construction and operated by Owner, submit completed documents within ten days after acceptance.
3. Submit 1 copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
4. Submit two sets of revised final documents in final form within 10 days after final inspection.

C. Warranties and Bonds:
1. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after acceptance.
2. Make other submittals within ten days after Date of Substantial Completion, prior to final Application for Payment.
3. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

## PART 2 - PRODUCTS - NOT USED

## PART 3 - EXECUTION

### 3.01 PROJECT RECORD DOCUMENTS

A. Maintain on site one set of the following record documents; record actual revisions to the Work:
1. Drawings.
2. Specifications.
3. Addenda.
4. Change Orders and other modifications to the Contract.
5. Reviewed shop drawings, product data, and samples.
6. Manufacturer's instruction for assembly, installation, and adjusting.

B. Ensure entries are complete and accurate, enabling future reference by Owner.

C. Store record documents separate from documents used for construction.

D. Record information concurrent with construction progress.

E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
   1. Manufacturer's name and product model and number.
   2. Product substitutions or alternates utilized.
   3. Changes made by Addenda and modifications.

F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
   1. Field changes of dimension and detail.
   2. Details not on original Contract drawings.

**3.02 OPERATION AND MAINTENANCE DATA**

A. For Each Product or System: List names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.

B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.

C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.

D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

**3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES**

A. For Each Product, Applied Material, and Finish:

B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.

**3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS**

A. For Each Item of Equipment and Each System:
   1. Description of unit or system, and component parts.
   2. Identify function, normal operating characteristics, and limiting conditions.
   3. Include performance curves, with engineering data and tests.
   4. Complete nomenclature and model number of replaceable parts.

B. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.

C. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.

D. Provide servicing and lubrication schedule, and list of lubricants required.

E. Include manufacturer's printed operation and maintenance instructions.

F. Include sequence of operation by controls manufacturer.

G. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.

H. Additional Requirements: As specified in individual product specification sections.

### 3.05 OPERATION AND MAINTENANCE MANUALS

A. Prepare instructions and data by personnel experienced in maintenance and operation of described products.

B. Prepare data in the form of an instructional manual.

C. Binders: Commercial quality, 8-1/2 x 11-inch three D side ring binders with durable plastic covers; 2 inch maximum ring size. When multiple binders are used, correlate data into related consistent groupings.

D. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; identify title of Project; identify subject matter of contents.

E. Provide tabbed dividers for each separate product and system, with typed description of product and major component parts of equipment.

F. Text: Manufacturer's printed data, or typewritten data on 24-pound paper.

G. Drawings: Provide with reinforced punched binder tab. Bind in with text; fold larger drawings to size of text pages.

### 3.06 WARRANTIES AND BONDS

A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within ten days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.

B. Verify that documents are in proper form, contain full information, and are notarized.

C. Co-execute submittals when required.

D. Retain warranties and bonds until time specified for submittal.

E. Include originals of each in operation and maintenance manuals, indexed separately on Table of Contents.

F. Warranties submitted shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and the laws of governing jurisdictions and is in addition to and runs concurrently with other warranties made by the Contractor under requirements of the Contract Documents.

**END OF SECTION**

# SECTION 02230

# SITE CLEARING

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Clearing and protection of vegetation.

B. Removal of existing debris.

### 1.02 RELATED SECTIONS

A. Section 01100 - Summary: Limitations on Contractor's use of site and premises.

B. Section 01500 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.

C. Section 01700 - Execution Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products.

D. Section 02930 - Exterior Plants: Relocation of existing trees, shrubs, and other plants.

### 1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Site Plan: Showing:
   1. Vegetation removal limits.
   2. Areas for temporary construction and field offices.

### 1.04 QUALITY ASSURANCE

A. Clearing Firm: Company specializing in the type of work required.
   1. Minimum of five years of documented experience.

### 1.05 PROJECT CONDITIONS

A. Minimize production of dust due to clearing operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.

B. Comply with other requirements specified in Section 01700.

## PART 2 - PRODUCTS

### 2.01 MATERIALS

A. Fill Material: As specified in Section 02201 – Earthwork.

## PART 3 - EXECUTION

### 3.01 EXISTING UTILITIES AND BUILT ELEMENTS

A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.

B. Protect existing utilities to remain from damage.

C. Do not disrupt public utilities without permit from authority having jurisdiction.

D. Protect existing structures and other elements that are not to be removed.

### 3.02 VEGETATION

A. Scope: Remove trees, shrubs, brush, and stumps in areas to be covered by building structure, paving, playing fields, lawns, and planting beds.

B. Do not begin clearing until vegetation to be relocated has been removed.

C. Do not remove or damage vegetation beyond the following limits:
   1. 40 feet outside the building perimeter.
   2. 5 feet each side of roadway curbs, walkways, and main utility trenches.
   3. Exception: Specific trees and vegetation indicated on drawings to be removed.

D. Install substantial, highly visible fences at least 3 feet high to prevent inadvertent damage to vegetation to remain:
   1. At vegetation removal limits.
   2. Around trees to remain within vegetation removal limits; locate no closer to tree than at the drip line.
   3. Around other vegetation to remain within vegetation removal limits.

E. Vegetation Removed: Do not burn, bury, landfill, or leave on site, except as indicated.
   1. Chip, grind, crush, or shred vegetation for mulching, composting, or other purposes; preference should be given to on-site uses.
   2. Trees: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
   3. Existing Stumps: Treat as specified for other vegetation removed; remove stumps and roots to depth of 18 inches.
   4. Sod: Re-use on site if possible; if not, treat as specified for other vegetation removed.
   5. Fill holes left by removal of stumps and roots, using suitable fill material, with top surface neat in appearance and smooth enough not to constitute a hazard to pedestrians.

F. Dead Wood: Remove all dead trees (standing or down), limbs, and dry brush on entire site; treat as specified for vegetation removed.

G. Restoration: If vegetation outside removal limits or within specified protective fences is damaged or destroyed due to subsequent construction operations, replace at no cost to Owner.

**3.03 DEBRIS**

A. Remove debris, junk, and trash from site.

B. Leave site in clean condition, ready for subsequent work.

C. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**

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**SECTION 02361**

# SOIL TREATMENT FOR TERMITE CONTROL

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Chemical soil treatment.

### 1.02 REFERENCES

A. Title 7, United States Code, 136 through 136y - Federal Insecticide, Fungicide and Rodenticide Act; United States Code; 1947 (Revised 1988).

### 1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Indicate toxicants to be used, composition by percentage, dilution schedule, intended application rate.

C. Test Reports: Indicate regulatory agency approval reports when required.

D. Manufacturer's Application Instructions: Indicate caution requirements and application rates.

E. Manufacturer's Certificate: Certify that toxicants meet or exceed specified requirements.

F. Warranty: Submit warranty and ensure that forms have been completed in Owner 's name.

### 1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing this type of work.
   1. Having minimum of 2 years documented experience.
   2. Licensed in the State in which the Project is located.

### 1.05 REGULATORY REQUIREMENTS

A. Conform to applicable code for requirements for application, and comply with EPA regulations.

B. Provide certificate of compliance from authority having jurisdiction indicating approval of toxicants.

### 1.06 SEQUENCING

A. Apply toxicant immediately prior to finish grading work outside foundations.

### 1.07 WARRANTY

A. See Section 01780 - Closeout Submittals, for additional warranty requirements.

B. Provide five year installer's warranty against damage to building caused to termites.

## PART 2 PRODUCTS

### 2.01 MATERIALS

A. Manufacturers:
   1. Agrotec, Inc.
   2. Bayer Corp.
   3. Chas. H Lilly Co.
   4. Substitutions: See Section 01600 - Product Requirements.

B. Toxicant Chemical: EPA approved; synthetically color dyed topermit visual identification of treated soil.

C. Diluent: Recommended by toxicant manufacturer.

**2.02 MIXES**

A. Mix toxicant to manufacturer's instructions.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that soil surfaces are unfrozen, sufficiently dry to absorb toxicant, and ready to receive treatment.

B. Verify final grading is complete.

**3.02 APPLICATION**

A. Spray apply toxicant in accordance with manufacturer's instructions.

B. Apply toxicant at following locations:
1. Under Slabs-on-Grade.
2. In Crawl Spaces.
3. At Both Sides of Foundation Surface.

C. Apply extra treatment to structure penetration surfaces such as pipe or ducts, and soil penetrations such as grounding rods or posts.

D. Re-treat disturbed treated soil with same toxicant as original treatment.

E. If inspection or testing identifies the presence of termites, re-treat soil and re-test.

**3.03 PROTECTION OF FINISHED WORK**

A. Do not permit soil grading over treated work.

## END OF SECTION

# SECTION 03365

# CONCRETE SEALER

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

### 1.02 RELATED SECTIONS

A. Section 03300 - Cast-in-Place Concrete.

### 1.03 SUBMITTALS

A. Comply with Section 01300 – Administrative Requirements.

B. Product Data: Submit manufacturer's product data, including surface preparation and application instructions.

C. Installer's Project References: Submit list of successfully completed projects, including project name and location, name of architect, and type and quantity of concrete floor stain applied.

D. Maintenance Instructions: Submit manufacturer's maintenance and cleaning instructions.

### 1.04 QUALITY ASSURANCE

A. Single Source Responsibility: Concrete floor stain materials shall be products of a single manufacturer.

B. Installer's Qualifications:
   1. Successful experience in application of similar concrete floor stains.
   2. Employ persons trained for application of concrete floor stains.

### 1.05 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying manufacturer, product name, and concrete floor stain color.

B. Storage: Store materials in a clean, dry area indoors in accordance with manufacturer's instructions. Keep containers sealed until ready for use.
   1. Concrete Floor Sealer: Keep away from ignition sources. Do not allow to freeze.

C. Handling: Protect materials during handling and application to prevent damage or contamination.

### 1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not apply concrete floor stain when air or surface temperature is below 40 degrees F.

B. Concrete Floor Sealer: Do not apply when air or surface temperature is below 55 degrees F.

C. Exterior Surfaces: Do not apply materials in wet weather.

### 1.07 SEQUENCING

A. Prepare surface and apply concrete floor stain after interior finish work is completed and before baseboards are installed.

## PART 2 PRODUCTS

### 2.01 MANUFACTURER

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### 2.03 CONCRETE FLOOR SEALER

A. Concrete Floor Sealer: Kemiko Stone Tone Sealer.
   1. Acrylic water-based urethane clear sealer.
   2. Solids Content: 30 percent.
   3. Non-yellowing.
   4. Resistant to blush.
   5. Satin finish.
   6. VOC compliant.
   7. Quick drying.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Examine surfaces to receive concrete floor stain. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

### 3.02 SURFACE PREPARATION

A. Protection:
   1. Protect walls and surrounding surfaces not to receive concrete floor stain.
   2. Do not allow stain to come in contact with wood or metal surfaces.

B. Prepare concrete surface in accordance with manufacturer's instructions.

C. Ensure concrete is a minimum of 28 days old.

D. Ensure concrete surface is clean, dry, structurally sound, and free from dirt, dust, oil, grease, solvents, paint, wax, asphalt, concrete curing compounds, sealing compounds, surface hardeners, bond breakers, adhesive residue, and other surface contaminants.

E. Do not acid wash or use heavy alkali cleaners.

### 3.03 APPLICATION

F. Concrete Floor Sealer: Apply concrete floor sealer over concrete floor stain in accordance with manufacturer's instructions.

G. Keep material containers closed when not in use to avoid contamination.

### 3.04 PROTECTION

A. Protect stained concrete floor from damage during construction.

B. Protect concrete surfaces from foot traffic for a minimum of 24 hours.

C. Avoid washing concrete surfaces for a minimum of 48 hours.

**END OF SECTION**

**SECTION 03370**

**CONCRETE POLISHED FLOOR STAIN AND SEALER**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Concrete floor stain.

### 1.02 RELATED SECTIONS

A. Section 03300 - Cast-in-Place Concrete.

### 1.03 SUBMITTALS

A. Comply with Section 01300 – Administrative Requirements.

B. Product Data: Submit manufacturer's product data, including surface preparation and application instructions.

C. Color Samples: Submit manufacturer's standard color chart.

D. Installer's Project References: Submit list of successfully completed projects, including project name and location, name of architect, and type and quantity of concrete floor stain applied.

E. Maintenance Instructions: Submit manufacturer's maintenance and cleaning instructions.

### 1.04 QUALITY ASSURANCE

A. Single Source Responsibility: Concrete floor stain materials shall be products of a single manufacturer.

B. Installer's Qualifications:
   1. Successful experience in application of similar concrete floor stains.
   2. Employ persons trained for application of concrete floor stains.

C. Preinstallation Meeting: Convene a preinstallation meeting before start of application of concrete floor stain. Require attendance of parties directly affecting work of this section, including Contractor, Architect, and applicator. Review surface preparation, application, protection, and coordination with other work.

### 1.05 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying manufacturer, product name, and concrete floor stain color.

B. Storage: Store materials in a clean, dry area indoors in accordance with manufacturer's instructions. Keep containers sealed until ready for use.
   1. Concrete Floor Sealer: Keep away from ignition sources. Do not allow to freeze.

C. Handling: Protect materials during handling and application to prevent damage or contamination.

### 1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not apply concrete floor stain when air or surface temperature is below 40 degrees F.

B. Concrete Floor Sealer: Do not apply when air or surface temperature is below 55 degrees F.

C. Exterior Surfaces: Do not apply materials in wet weather.

### 1.07 SEQUENCING

A. Prepare surface and apply concrete floor stain after interior finish work is completed and before baseboards are installed.

## PART 2 PRODUCTS

### 2.01 MANUFACTURER

A. Drawings and specifications are based on manufacturer's literature from Ameripolish or H&C unless otherwise indicated. Substitutions are permitted. Other manufacturers to comply with the minimum levels of material and detailing indicated on the drawings and in conformance with provisions of Section 01600 – Product Requirements.

B. Acceptable Manufacturer: Ameripolish or H&C

C. Substitutions: Permitted under provisions of Section 01600.

### 2.02 CONCRETE FLOOR STAIN

A. Concrete Floor Stain: Ameripolish Acetone or H&C (Sherwin Williams).
   1. Color: Selected from manufacturers standard range of colors.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Examine surfaces to receive concrete floor stain. Notify Architect if surfaces are not acceptable. Do not begin surface preparation or application until unacceptable conditions have been corrected.

### 3.02 SURFACE PREPARATION

A. Protection:
   1. Protect walls and surrounding surfaces not to receive concrete floor stain.
   2. Do not allow stain to come in contact with wood or metal surfaces.

B. Prepare concrete surface in accordance with manufacturer's instructions.

C. Ensure concrete is a minimum of 28 days old.

D. Ensure concrete surface is clean, dry, structurally sound, and free from dirt, dust, oil, grease, solvents, paint, wax, asphalt, concrete curing compounds, sealing compounds, surface hardeners, bond breakers, adhesive residue, and other surface contaminants.

E. Do not acid wash or use heavy alkali cleaners.

### 3.03 APPLICATION

A. Apply polished concrete floor stain in accordance with manufacturer's instructions at locations indicated on the drawings.

B. Control depth of color by adjusting volume of stain applied to floor.

C. Grind to a Class A finish – Cement Fines (Also called light sand/Cream Finish) - Class A is defined as 85 – 95% Cement Fines and 5 – 15% Fine Aggregate. The cement fines finish typically exposes only the sand particles in the concrete floor. This finish is considered a “creamy looking” surface and is the most popular choice for Architectural Ground & Polished floors.

D. Stain with one of the products noted above. Final product to look similar to image above.

E. Install Densifier after stain.

F. Polish to a Level 2 Satin (Honed) finish with image clarity value of 10-39% - A level 2 honed polish is obtained by stopping at the 400-grit resin bond, producing a low-sheen finish. When you look directly down at the finished floor and at a distance of roughly 100 feet, you can start to see a slight overhead reflection. This grit level produces a low-luster matte finish.

G. Keep material containers closed when not in use to avoid contamination.

**3.04 PROTECTION**

A. Protect stained concrete floor from damage during construction.

B. Protect concrete surfaces from foot traffic for a minimum of 24 hours.

C. Avoid washing concrete surfaces for a minimum of 48 hours.

**END OF SECTION**

SECTION 03 10 00

CONCRETE FORMWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 00 00 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

The work of this section includes all labor, materials and equipment required to form all cast-in-place concrete shown on the drawings including but not limited to all slabs, joists, beams, columns, walls, stairs, and equipment pads.

1.3 CODES AND STANDARDS

Comply with the provision of the following codes, specifications and standards except where more stringent requirements are shown or specified:

A. ACI 301 "Specifications for Structural Concrete for Buildings"

B. ACI 318 "Building Code Requirements for Reinforced Concrete"

C. Concrete Reinforcing Steel Institute "Reinforced Concrete, Manual of Standard Practice"

D. ACI SP-4 "Formwork for Concrete"

In addition, all formwork shall be designed, erected, supported, braced, and maintained as a minimum according to ACI Standard 347 "Guide to Formwork".

1.4 RESPONSIBILITY

The design, construction and safety of all formwork shall be the responsibility of the General Contractor. All forms, shores, backshores, falsework, bracing, and other temporary supports shall be engineered to support all loads imposed including the wet weight of concrete, construction equipment, live loads, lateral loads due to wind and wet concrete imbalance. The Contractor shall also be responsible for determining when temporary supports, shores, backshores, and other bracing may be safely removed.

1.5 DESIGN RESPONSIBILITY

The design of all concrete formwork, formwork removal, shoring, and backshoring requirements shall be performed by a registered professional engineer in the state where the project is located and experienced in the design of concrete formwork. The formwork engineer shall be employed by the Contractor. Calculations, sealed by the registered professional engineer, shall be issued for Owner's record but will not be reviewed or returned.

1.6 SUBMITTALS

A. Design Calculations:

Submit for record calculations of all concrete formwork sealed by a registered engineer in the state where the project is located.

B. Formwork Drawings:

Formwork Drawings, prepared under the supervision and sealed by a registered professional engineer in the state where the project is located, shall be submitted for Owners record and shall be reviewed by the Engineer for conformance to structural drawing layout only. Such shop drawings shall indicate types of materials, sizes, lengths, connection details, design allowance for construction loads, anchors, form ties, shores, braces, construction joints, reveals, camber, openings, formwork coatings and all other pertinent information as specified in ACI 347.

C. Shoring Plan:

Submit drawings to indicate the number of levels of shoring, proposed time and sequence of formwork and shore removal, minimum concrete strength for stripping of forms and shore removal, assumed construction loads, amount and layout of shores (specify whether backshores or reshores), and length of time shores are to be left in place. This plan shall be strictly followed by the Contractor. Shoring plans are to be submitted for Owner's record only and will not be reviewed or returned.

## PART 2 - PRODUCTS

### 2.1 FORMS FOR EXPOSED FINISH CONCRETE

Unless otherwise specified, formwork for exposed concrete surfaces shall consist of plywood, metal, metal framed plywood, or other acceptable surface. Formwork shall provide a continuous straight and smooth surface conforming to the joint system as specified on the Architect's drawings. Form material shall have sufficient thickness to withstand pressure of concrete without bow or deflection. Plywood shall be overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High Density Overlaid Concrete Form", Class I, or plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge sealed, with each piece bearing legible inspection trademark.

### 2.2 FORMS FOR UNEXPOSED FINISH CONCRETE

Unless otherwise specified, formwork for unexposed concrete surfaces shall be constructed with plywood, lumber, metal or other acceptable material. Lumber shall be dressed on at least two edges and one side for tight fit.

### 2.4 FORMS FOR TEXTURE FINISHED CONCRETE

Units of concrete face design, size, arrangement and configuration shall match Architect's control sample. Provide solid backing and form supports to ensure stability of textured form liners. See Architect's drawings, specifications and control sample for special form textured finish concrete.

### 2.5 CYLINDRICAL COLUMNS AND SUPPORTS

Round section members shall be formed with metal, fiberglass, reinforced plastic, paper or fiber tubes, unless otherwise specified. Paper or fiber tubes shall be constructed of laminated plies using water resistant adhesive with wax impregnated exterior for weather and moisture protection. Units shall have sufficient wall thickness to resist loads imposed by wet concrete without deformation.

2.6 FORMWORK COATINGS

Formwork coatings shall be a commercial formulation that will not bond with, stain, nor adversely affect concrete surfaces or impair subsequent treatment of concrete surfaces requiring bond or adhesion, nor impede curing with water or curing compounds. Provide a product that has a maximum VOC (Volatile Organic Compounds) of 350 mg/l but not greater than permitted by the local government agency having jurisdiction in the area where the project is located.

2.7 NAILS AND FASTENERS

Use only galvanized nails and fasteners for securing formwork in structures exposed to weather or unconditioned spaces such as garages, canopies and porte-cocheres.

PART 3 - EXECUTION

3.1 FABRICATION AND CONSTRUCTION

A. Design, erect, support, brace and maintain formwork to support vertical and lateral loads that might be applied until such loads can be supported by concrete structure. Construct formwork so concrete members and structures are of correct size, shape, alignment, elevation and position. Maintain formwork construction tolerances complying with ACI 347.

B. Design formwork to be readily removable without impact, shock or damage to cast-in-place concrete surfaces and adjacent materials.

C. Construct forms to sizes, shapes, lines and dimensions shown, and to obtain accurate alignment, location, grades, level and plumb work in finished structures. Provide for openings, offsets, sinkages, keyways, recesses, moldings, rustications, reglets, chamfers, blocking, screeds, bulkheads, anchorages and inserts and other features required in work. Use selected materials to obtain required finishes. Solidly butt joints and provide back-up at joints to prevent leakage of cement paste.

D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush plates or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces where slope is too steep to place concrete with bottom forms only. Kerf wood inserts for forming keyways, reglets, recesses, and the like, to prevent swelling and for easy removal.

E. Provide temporary openings where interior area of formwork is inaccessible for cleanout, for inspection before concrete placement, and for placement of concrete. Securely brace temporary openings and patch forms to prevent loss of concrete mortar. Locate temporary openings on forms at inconspicuous locations.

F. Chamfer exposed corners and edges as indicated, using wood, metal, PVC or rubber chamfer strips fabricated to produce uniform smooth lines and tight edge joints.

G. Form Ties:

Factory-fabricated, adjustable-length, removable or snapoff metal form ties, designed to prevent form deflection, and to prevent spalling concrete surfaces upon removal. Unless otherwise indicated, provide ties so portion remaining within concrete after removal is 1 1/2" inside concrete and will not leave holes larger than 1" diameter in concrete surface. Provide only galvanized form ties in structures exposed to weather or unconditioned spaces.

H. Provisions for Other Trades:

Provide openings in concrete formwork to accommodate work of other trades. Determine size and location of openings, recesses and chases from trades providing such items. Accurately place and securely support items built into forms.

## 3.2 CLEANING AND TIGHTENING

Thoroughly clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and all other debris just prior to concrete placement. Retighten forms and bracing prior to concrete placement as required to prevent mortar leaks and maintain proper alignment.

## 3.3 CLEANING AND RE-USE OF FORMS

Forms reused in the work shall be repaired and cleaned. Split, frayed, delaminated, or otherwise damaged facing material will not be acceptable for exposed surfaces. Forms intended for successive concrete placement shall have surfaces cleaned, fins and laitance removed, and joints tightened to avoid surface offsets. New form coating compound shall be applied to reused forms. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with in-place concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions. Coat steel forms with a non-staining, rust-preventative form oil or otherwise protect against rusting. Rust-stained steel formwork is not acceptable.

## 3.4 TOLERANCES

Unless specified otherwise, all tolerances for concrete formwork shall conform to ACI Standard 117, "Standard Tolerances for Concrete Construction and Materials". Before concrete placement the Contractor shall check lines and levels of erected formwork and make any corrections and adjustments as required to ensure proper size and location of concrete members and stability of forming systems. During concrete placement the Contractor shall check formwork and supports to ensure that forms have not displaced and that completed work will be within specified tolerances.

The Owner should be given the opportunity to hire an independent qualified surveyor to verify the proper form, line, position, and elevation of the finished concrete work. If provided, the results of each survey shall be sent to the Owner, Architect/Engineer, and Contractor and shall identify any deviation from specified tolerances. All work not in conformance with specified tolerances shall removed at the Contractor's sole expense if so specified by the Owner.

## 3.5 SHORES AND SUPPORTS

A. Definitions

1. Shores: Vertical or inclined support members designed to carry the weight of formwork, concrete, and construction loads above.

2. Reshores: Shores placed snugly under a stripped concrete structural member after the original forms and shores have been removed from the member, thus requiring the member to carry its own weight and superimposed construction loads at the time of installation. Reshores are assumed to carry no load at the time of installation. After the installation of reshores, superimposed construction loads are assumed to be distributed among all members connected by reshores.

3. Backshores: Shores placed snugly under a stripped concrete structural member after the original formwork and shores have been removed from a small area without allowing the structural member to deflect or support its own weight or superimposed construction loads. It is assumed that backshores carry the same load as that carried by the original shores they replace.

Comply with ACI 347 for shoring, reshoring and backshoring in concrete construction and as herein specified where more stringent:

B. Structures with Three Supported Levels or Less:

Extend shoring from soil supported slab or suitable subgrade to uppermost level for structures with three structurally supported levels or less.

## 3.6 REMOVAL OF FORMS AND SUPPORTS

A. Determination by Contractor's Registered Engineer:

The Contractor's registered engineer shall determine and submit for Owner's record the time and sequence of formwork and shore removal subject to the criteria as specified below. The submittal shall clearly distinguish between reshoring and backshoring procedures.

B. Curing and Stripping Concrete Cylinders:

The General Contractor shall be responsible for making and curing stripping concrete cylinders, cured under field conditions, for the purpose of determining concrete strength at time of form and shore removal. Such cylinders shall be made by the Contractor and tested by his testing laboratory.

C. Records of Weather Conditions:

The General Contractor shall be responsible for keeping records of weather conditions to be used in the decision on when to remove forms.

D. Formwork Not Supporting Concrete:

Formwork not supporting concrete such as sides of beams, walls, columns and similar parts of the structure, may be removed after cumulatively (not necessarily consecutively) curing at not less than 50°F for 12 hours after placing concrete, provided the concrete is

sufficiently hard so as not to be damaged by form removal operations and provided curing and protection operations are maintained. If ambient air temperatures remain below 50°F or if retarding agents are used, then this specified minimum period should be increased as required to safely remove the forms without damage to the concrete. Where such forms also support formwork for slab or beam soffits, the removal times of the latter shall govern.

E. Formwork Supporting Weight of Concrete:

Formwork supporting weight of concrete such as beam soffits, joists, slabs and other structural elements shall not be removed until concrete has attained at least 75% (2800 psi min) of the design minimum 28 day compressive strength:

F. Placing Reshores and Backshores:

1. All shoring operations shall be carried out in accordance with a planned sequence as determined by the Contractor's shoring engineer.

2. Shoring operations shall be performed so that at no time will areas of new construction be required to support combined dead and construction loads in excess of the available strength as determined by the design loads (as specified in the General Notes) and the developed concrete strength (as determined by field cured cylinders) at the time of stripping and reshoring or backshoring.

3. Shores (backshores or reshores) shall not be removed until the structural member supported has sufficient strength to support all applied loads.

4. For backshoring operations, the forms shall be removed in such a manner that individual structural members are not allowed to deflect and carry load.

5. Reshoring operations require that the structural members be strong enough to safely support their own weight before stripping of formwork.

6. For reshoring operations, no structural member shall be overstressed under its own dead weight plus the weight of the floors above and construction loads assigned to the structural member by a rational analysis that accounts for the relative stiffness of each floor with due consideration of concrete age and strength. While reshoring is underway, no construction loads shall be permitted on the new construction unless it can safely support the construction loads.

7. Where possible, shores shall be located in the same position on each floor so that they will be continuous in their support from floor to floor.

END OF SECTION 03 10 00

# SECTION 03 20 00

# CONCRETE REINFORCEMENT

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 00 00 Specification Sections apply to work of this section.

### 1.2 DESCRIPTION OF WORK

The work of this section includes labor, materials, hardware, equipment, transportation and services required to fabricate and place all reinforcement for cast-in-place concrete including bars, welded wire fabric, ties and supports shown on the drawings and as specified. Prestressing reinforcement is specified in Precast Concrete sections of the specifications.

### 1.3 QUALITY ASSURANCE

A. Codes and Standards:

Comply with all provisions of the following codes, specifications and standards except where more stringent requirements are shown or specified:

1. ACI 315, "ACI Manual of Standard Practice for Detailing Reinforced Concrete Structures".

2. ACI 318, "Building Code Requirements for Reinforced Concrete."

3. Concrete Reinforcing Steel Institute, "Reinforced Concrete, Manual of Standard Practice".

4. Concrete Reinforcing Steel Institute, "Placing Reinforcing Bars."

### 1.4 SHOP DRAWINGS

A. Shop drawings and samples for all reinforcing steel and related accessories shall be submitted for the Engineer's approval.

B. Shop Drawings shall show layout, bending and assembly diagrams, bar schedules, stirrup spacing, splicing and laps of bars and shall be prepared in accordance with ACI 315 Standards.

### 1.5 TESTING AND INSPECTION

Perform all tests and inspections as specified in the Laboratory Testing Section of these specifications.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

A. Reinforcement:

1. Reinforcing Steel:
All reinforcing steel shall conform to the " Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement," ASTM A615 Grade 60 unless noted otherwise on the drawings. All reinforcing steel required to be welded shall conform to ASTM A 706 "Standard Specification for Low-Alloy Steel Deformed Bars for Concrete Reinforcement".

2. Welded Wire Fabric:
Welded smooth wire fabric for concrete reinforcement shall conform to the "Standard Specification for Welded Steel Wire Fabric for Concrete Reinforcement," ASTM A 185 with a yield strength of 65,000 PSI. Welded deformed wire fabric for concrete reinforcement shall conform to the "Standard Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement," ASTM A 497 with a yield strength of 70,000 PSI. All welded wire fabric shall be furnished in flat sheets only.

3. Tie Wire:
Tie wire shall be annealed steel tie wire, minimum 16 gauge. Provide only plastic coated or stainless steel tie wire in exposed concrete structures and all architectural concrete.

B. Supports for Reinforcement:

Provide supports for reinforcement including bolsters, chairs, spacers and other devices for spacing, supporting and fastening reinforcing bars and welded wire fabric in place. Use wire bar type supports complying with CRSI recommendations.

1. Slabs-on-Grade:

Use supports with sand plates or horizontal runners.

2.2 SPLICES

A. Splice Type and Lap Lengths:

Required splice type and lap lengths are defined on the drawings. Lap splice lengths for unscheduled bars not shown otherwise on the drawings shall be 40 bar diameters minimum.

B. Dowel Bar Replacement:

All reinforcing steel bars shown on the drawings crossing concrete construction joint surfaces with inserts cast flush against the form and having dowels connected to the insert in a subsequent concrete pour shall conform to the following:

1. Splice connection at insert shall develop the full tensile capacity of the reinforcing steel.

2. Inserts shall be one of the following:

"Lenton Form Saver", tapered thread dowel
and insert, as manufactured
by Erico Products, Inc.

"Dowel Bar Splicer", dowel bar substitution
and rebar splice system
(DB-SAE Splicer) as manufactured
by Richmond Screw Anchor Co., Inc.

Other splice assemblies may be used only if approved by the Engineer.

## PART 3 - EXECUTION

### 3.1 FABRICATION AND DELIVERY

A. Bending and Forming:

Fabricate bars of indicated sizes and accurately form to shapes and lengths indicated and required, by methods not injurious to materials. Do not heat reinforcement for bending. Bars with kinks or bends not scheduled will be rejected.

B. Marking and Shipping:

Bundle reinforcement and tag with suitable identification to facilitate sorting and placing. Transport and store at site so as not to damage material. Keep sufficient supply of tested, approved and proper reinforcement at the site to avoid delays. Maintain reinforcing bars free of mud, dirt, grease, or other coating.

### 3.2 PLACING REINFORCEMENT

A. Comply with Concrete Reinforcing Steel Institute's recommended practice for "Placing Reinforcing Bars", for details and methods of reinforcement placement and supports and as herein specified.

B. Before placing and again before concrete is placed, clean reinforcement of loose rust and mill scale, earth, ice and other materials which reduce or destroy bond with concrete.

C. Accurately position, support and secure reinforcement against displacement by formwork, construction, or concrete placement operations. Locate and support reinforcing by metal chairs, runners, bolsters, spacers and hangers, as required. Exercise particular care to maintain proper distance and clearance between parallel bars and between bars and forms. Provide metal spreaders and spacers to hold steel in position. Support steel at proper height upon approved chairs.

D. Place reinforcement to obtain at least minimum coverages for concrete protection. Arrange, space and securely tie bars and bar supports to hold reinforcement in position during concrete placement operations. Set wire ties so ends are directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire fabric in as long lengths as practicable. Lap adjoining pieces at least one full mesh plus two inches and lace splices with wire. Offset end laps in adjacent widths to prevent continuous laps in either direction. Welded wire fabric shall be furnished and placed in flat sheets only.

F. Coordinate with other trades and expedite materials and labor to avoid omissions and delay.

G. Install waterproof membrane or moisture barrier as specified prior to placing steel for concrete slabs-on-grade.

H. Extend reinforcement continuous through construction joints or, if approved on the shop drawings, provide dowels of sufficient length to develop the full tension or compression strength of the bar as applicable.

I. Provide and place additional reinforcing steel at all sleeves and openings in beams, slabs and walls as specified on the drawings. Where reinforcement is interrupted by sleeves or openings not shown on the drawings, consult with Engineer for instructions for placing and splicing of bars. Provide required additional reinforcing steel at no additional cost to the Owners.

3.3 REINFORCING STEEL SPACING AND COVERAGE

A. Reinforcing Steel Coverage

Reinforcing steel coverage should conform to the requirements specified in the General Notes. Cover specified shall be considered minimums that may require increasing where reinforcing steel intersects for different member types. Cover in structural members not specified in the General Notes shall conform to the requirements of ACI 318-83 Section 7.7 unless specified otherwise on the drawings.

B. Reinforcing Steel Spacing:
The clear distance between parallel bars in a layer shall be not less than the bar diameter nor 1". Where parallel reinforcement is placed in 2 or more layers, bars in the upper layer shall be placed directly above bars in the lower layer with clear distance between layers of not less than 1".

3.4 SPLICING REINFORCING STEEL

A. All lap splices in reinforcing steel shall be contact lap splices unless detailed otherwise on the drawings.

B. Maintain proper cover between reinforcing bars at splices.

C. Lap unscheduled reinforcing bars not otherwise specified a minimum of 40 bar diameters at splices. Lap welded wire fabric a minimum of one full wire mesh plus two inches.

3.5 WELDING REINFORCING STEEL

A. Welding reinforcing steel is permitted only where specifically shown on the drawings. All welding shall conform to AWS D1.4 "Structural Welding Code - Reinforcing Steel". Only weldable reinforcing steel conforming to ASTM A706 or deformed bar anchors conforming to ASTM A496 shall be permitted. ASTM A615 Grade 40 or Grade 60 bars may not be welded for structural use.

B. Scheduled or detailed reinforcing steel shall not be tack welded for any reason.

3.6 SHRINKAGE AND TEMPERATURE REINFORCEMENT

Provide shrinkage and temperature reinforcement at right angles to main top and bottom bars for all structural slabs unless detailed otherwise on the drawings. See drawings for sizes and spacings.

3.7 PLACEMENT OF WELDED WIRE FABRIC

Wherever welded wire fabric is specified as reinforcement in slabs, it shall be continuous and properly lapped one full wire spacing plus 2" across the entire concrete surface and not interrupted by beam or girders.

3.8 MECHANICAL AND PLUMBING REQUIREMENTS

Refer to Mechanical and Plumbing Drawings for formed concrete requiring reinforcing steel. Such reinforcement shall be furnished as part of the work of this section.

3.9 QUALITY CONTROL TESTING DURING CONSTRUCTION

See Testing Laboratory Services section of these specifications 01 45 29 for concrete reinforcement inspection and test requirements.

END OF SECTION 03 20 00

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 01 00 00 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK

A. Extent of concrete work is shown on drawings, including schedules, notes and details which show size and location of members and type of concrete to be poured. Furnish all labor, materials, services, equipment and hardware required in conjunction with or related to the forming, delivery and pouring of all poured-in-place concrete work.

B. Architectural Concrete is specified in other Division-3 sections.

1.3 QUALITY ASSURANCE

The Contractor is responsible for quality control, including workmanship and materials furnished by his subcontractors and suppliers.

A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except where more stringent requirements are shown or specified:

1. ACI 301 - "Specifications for Structural Concrete for Buildings".
2. ACI 302 - "Guide for Concrete Floor and Slab Construction".
3. ACI 304 - "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".
4. ACI 305 - "Recommended Practice for Hot Weather Concreting".
5. ACI 306 - "Recommended Practice for Cold Weather Concreting".
6. ACI 309 – “Guide for Consolidation of Concrete”
7. ACI 318 - "Building Code Requirements for Reinforced Concrete".

B. Document Precedence: In case of conflict among documents, including architectural and structural drawings and specifications, notify the Architect prior to submitting proposal. In case of conflict between the structural drawings and specifications, the strictest interpretation shall govern.

C. Materials and installed work may require testing and retesting, as directed by the Architect/Engineer, at any time during progress of work. Allow free access to material stockpiles and facilities. Tests, not specifically indicated to be done at the Owner's expense, including retesting of rejected materials and installed work, shall be done at the Contractor's expense. See Testing Laboratory section of the Specifications 01 45 29.

Inspection or testing by the Owner does not relieve the Contractor of his responsibility to perform the Work in accordance with the Contract Documents.

1.4 REGULATORY REQUIREMENTS

A. Conform to applicable Building Code.

1.5 SUBMITTALS

A. Product Data: Submit manufacturer's product data with application and installation instructions for proprietary materials and items, including admixtures, patching compounds, epoxies, grouts, waterstops, joint systems, curing compounds, dry-shake finish materials, hardeners, sealers and others as requested by Architect/Engineer.

B. Samples: Submit samples of materials specified if requested by Architect/ Engineer, including names, sources and descriptions.

C. Laboratory Test Reports and Mix Designs: Submit laboratory test reports for concrete materials and mix designs as specified in the Testing Laboratory section of the Specifications.

D. Material and Mill Certificates: Provide material and mill certificates as specified herein and in the Testing Laboratory section of the Specifications. Material and mill certificates shall be signed by manufacturer and Contractor, certifying that each material item complies with, or exceeds, specified requirements.

E. Submit shop drawings indicating control joints, expansion joints, construction joints and embed locations.

1.6 PROVISION FOR OTHER WORK

Provide for installation of inserts, hangers, metal ties, anchors, bolts, angle guards, dowels, thimbles, slots, nailing strips, blocking, grounds and other fastening devices required for attachment of work. Properly locate in cooperation with other trades and secure in position before concrete is poured. Do not install sleeves in any concrete slabs, beams or columns except where shown on the drawings or upon written approval of the Architect/Engineer.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

Refer to the drawings for classes and strengths of concrete required.

A. Portland Cement:
ANSI/ASTM C 150, Type I or Type III, unless otherwise approved by the Architect/Engineer.

Use one brand of cement, for each class of concrete, throughout the project, unless approved otherwise by the Architect/Engineer and the Owner's Testing Laboratory.

B. Coarse Aggregate: ASTM C 33, hard, durable, uncoated, crushed limestone or other approved aggregate. Provide aggregates from a single source for exposed concrete.

C. Fine Aggregate: ASTM C 33, clean, hard, durable, natural sand free from silt, loam or clay.

D. Water: Clean, fresh, drinkable, free of oils, acids or organic matter.

E. Fly Ash: ASTM C 618, Class C or F. Fly ash replacement of cement shall not exceed 20% (one part fly ash max. to four parts cement) by weight.

2.2 ADMIXTURES

A. Water-Reducing Admixture: ANSI/ASTM C 494, Type A. See maximum permissible chloride ion content in concrete specified below. Submit manufacturer's certification that product conforms to the requirements specified.

B. Water-Reducing Admixture (Super Plasticizer):
ASTM C 494, Type F or Type G (high range). See maximum permissible chloride ion content in concrete specified below. Submit manufacturer's certification that product conforms to the requirements specified.

C. Water-Reducing, Accelerator Admixture (Non-Corrosive, Non-Chloride): ASTM C 494, Type C or E. See maximum permissible chloride ion content in concrete specified below. Submit manufacturer's certification that product conforms to the requirements specified.

D. Water-Reducing, Retarding Admixture: ASTM C 494, Type D. See maximum permissible chloride ion content in concrete specified below. Submit manufacturer's certification that product conforms to the requirements specified.

E. Admixtures containing Chloride Ions: Admixtures containing chloride ions shall not be used in prestressed concrete, concrete containing galvanized or aluminum embedments, concrete containing high early strength cement (Type III), concrete on metal deck floors or roofs, or concrete exposed to sulfate containing solutions such as soils with a water soluble sulfate content more than 0.20 percent by weight and all water with a sulfate content more than 1500 parts per million. Admixtures containing more than 0.05% chloride ions shall not be permitted. The maximum chloride ion content in concrete for corrosion protection shall be as follows:

| Type of Member of Cement | Max. Water Soluble Chloride Ion in Concrete at 28 Days, % by weight |
|---|---|
| Prestressed Concrete | 0.06 |
| Reinforced Concrete and other structures, which may be exposed to chloride in service | 0.15 |
| Reinforced Concrete in buildings and other structures that will be dry or protected from moisture in service | 1.00 |
| All other reinforced concrete construction | 0.30 |

The Contractor shall have the Concrete Supplier's Testing Laboratory verify in a written submittal to the Architect/Engineer and Owner's Testing Laboratory that the chloride ion content in all concrete mix designs used on the project will not exceed limits stated above.

F. Prohibited Admixtures: Calcium chloride, thiocyanates or admixtures containing more than 0.05% chloride ions are not permitted.

G. Certification: Written conformance to the above mentioned requirements and the chloride ion content of the admixture will be required from the admixture manufacturer prior to mix design review by the Engineer.

2.2 RELATED MATERIALS

A. Waterstops: Provide waterstops at all construction joints and other joints in all foundation walls below grade and where shown on the drawings. Size to suit joints.

1. Rubber waterstops: Corps of Engineers CRD-C 513.

2. Polyvinyl chloride (PVC) waterstops: Corps of Engineers CRD-C 572.

3. Preformed Plastic Waterstops: Federal Specifications SS-S-210A "Sealing Compound for Expansion Joints".
Manufacturers:

B. Moisture Barrier: Provide moisture barrier cover over prepared base material where indicated. Use only materials, which are resistant to decay when tested in accordance with ANSI/ASTM E 154, as follows:

1. Polyethylene sheet not less than 10 mils thick.

C. Absorptive Cover: Burlap cloth made from jute or kenaf, weighing approximately 9 oz. per sq. yd., complying with AASHTO M 182, Class 2.

D. Moisture-Retaining Cover:
One of the following, complying with ANSI/ASTM C 171:

1. Waterproof paper.

2. Polyethylene film.

3. White-burlap-polyethylene sheet.

E. Non-slip Aggregate Finish: Provide fused aluminum oxide grits, or crushed emery, as abrasive aggregate for non-slip finish with emery aggregate containing not less than 40% aluminum oxide and not less than 25% ferric oxide. Use material that is factory-graded, packaged, rust-proof and non-glazing, and is unaffected by freezing, moisture and cleaning materials.

F. Colored Wear-Resistant Finish: Packaged, dry, combination of materials, consisting of portland cement, graded quartz aggregate, coloring pigments (if required) and plasticizing admixtures. Use coloring pigments that are finely ground, non-fading mineral oxides, interground with cement. Color, as selected by Architect, unless otherwise indicated.

G. Liquid Membrane-Forming Curing Compound:
Liquid type membrane forming curing compound complying with ANSI/ASTM C 309, Type I, Class A unless otherwise acceptable to the Architect/Engineer. Submit manufacturer's certification that product conforms to the requirements specified.

H. Chemical Curing/Floor Hardener Compound: A clear liquid chemically acting compound of sodium silicate that performs as a curing agent with a penetrating compound that changes the free lime in the concrete to calcium silicate, resulting in a surface having a maximum abrasion coefficient of 0.25 $cm^3/cm^2$ when tested in accordance with ASTM C 118. Submit manufacturer's certification that product conforms to the requirements specified.

I. Chemical Hardener: Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, containing not less than 2 lb. of fluosilicates per gal. Submit manufacturer's certification that product conforms to the requirements specified.

J. Bonding Compound: Polyvinyl acetate or acrylic base, rewettable type for use in cosmetic nonstructural repairs.

K. Epoxy Products: Two component material suitable for use on dry or damp surface, complying with ASTM C 881, for use in all structural concrete repairs.

L. Expansion Bolts in Concrete:
1. ICBO Approval: Only concrete anchors approved by the International Conference of Building Officials (ICBO) with a published Research Report shall be approved for use.

2. Type: All expansion bolts in concrete shall be only wedge type expansion bolts.

3. Interior Use: All expansion bolts, nuts and washers for use in interior conditioned environments free of potential moisture shall be manufactured from carbon steel zinc plated in accordance with Federal Specification QQ-Z-325C, Type II, Class 3.

4. Exterior or Exposed Use: All expansion bolts, nuts and washers for use in exposed or potentially wet environments, or for attachment of exterior cladding materials shall be galvanized or stainless steel. Galvanized bolts, nuts and washers shall conform to ASTM A 153. Stainless steel bolts shall be manufactured from 300 series stainless steel and nuts and washers from 300 series or Type 18-8 stainless steel.

5. Nuts and Washers: Nuts and washers shall be furnished from the manufacturer and used with the bolts.

M. Adhesive Bolts in Concrete:
1. Type: Adhesive bolts in concrete shall consist of a threaded steel rod meeting the requirements of ASTM A 307 and a sealed glass capsule containing polyester resin, quartz sand aggregate and a hardener.

2. Exterior Use: Adhesive bolts used in exterior, exposed, potentially wet environments and for attachment of exterior cladding materials shall have threaded rods manufactured from ASTM A 153 galvanized steel or 300 series stainless steel. Nuts and washers shall also be galvanized or stainless steel.

3. Nuts and Washers: Nuts and washers shall be furnished from the manufacturer and used with the bolts.

O. Non-Shrink Grout:
1. Type: Grout for base plates and bearing plates shall be a non-metallic, shrinkage resistant, premixed, non-corrosive, non-staining product containing Portland cement, silica sands, shrinkage compensating agents and fluidity improving compounds.

2. Specifications: Non-shrink grout shall conform to Corps of Engineers Specification for Non-Shrink Grout, CRD-C621-83.

3. Compressive Strength: Twenty-eight day compressive strength as determined by grout cube tests, shall be 10,000 psi.

2.3 PROPORTIONING AND DESIGN OF MIXES

A. Refer to Testing Laboratory section of the Specifications.

2.4 CONCRETE MIX DESIGN

A. Proportioning Normal Weight Concrete: Comply with ACI 211.1 recommendations.

B. Concrete Compressive Strength: As indicated on drawings when tested in accordance with ASTM C 39 at 28 days.

C. Selection of Concrete Proportions: Establish required average strength for each type of concrete on the basis of field experience or trial mixtures, as specified in ACI 301.
1. For trial mixtures method, employ independent testing agency acceptable to Architect for preparing and reporting proposed mix designs.

D. Fly Ash: Limit fly ash to a maximum of 20 percent of cement content by weight.

E. Maximum Aggregate Size: 1 inch.

F. Admixtures:
1. Use air-entraining admixture for exterior exposed concrete. Add air-entraining admixture at the manufacturer's prescribed rate to result in concrete at the point of placement having air content of 4.5 percent. Tolerance on air content as delivered shall be +/- 1.5 percent tested per ASTM C 173.
2. Do not use air-entraining admixtures for concrete slabs that are to receive a hard steel trowel finish.
3. Use water-reducing admixtures in strict compliance with the manufacturer's directions.

2.4 MIXING

A. On Project Site: Mix in drum type batch mixer, complying with ASTM C 685. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.

B. Transit Mixers: Comply with ASTM C 94.

PART 3 - EXECUTION

3.1 JOINTS IN CONCRETE

A. Construction Joints: Locate and install construction joints as indicated on the drawings or if not shown on drawings, located so as not to impair strength and appearance of the structure, as acceptable to Architect/Engineer.

1. Provide keyways at least 1-1/2" deep in construction joints in walls, slabs and between walls and footings, accepted bulkheads designed for this purpose may be used for slabs. See details on the drawings.

2. Place construction joints in the center one third of spans unless specified otherwise. Continue reinforcement across construction joints. Submit construction joint locations not shown on the drawings for Engineer's approval.

3. Waterstops: Provide waterstops in construction joints as indicated on the Architectural and Structural Drawings. Install waterstops to form continuous diaphragm in each joint. Make provisions to support and protect exposed waterstops during progress of work. Fabricate field joints in waterstops in accordance with manufacturer's printed instructions.

4. Isolation Joints in Slabs-on-Ground: Construct isolation joints (without dowels) in slabs-on-ground at points of contact between slabs on ground and vertical surfaces only where specifically detailed on the drawings. Provide construction joints with dowels at all location unless isolation joints are detailed.

5. Contraction (Control) Joints in Slabs-on-Ground:
Construct contraction joints in slabs-on-ground to form panels of patterns as shown in slab-on-grade details on the drawings. Use shear keys, dowels and joint filler as indicated. Form contraction joints by inserting premolded plastic hardboard or fiberboard strip into fresh concrete until top surface of strip is flush with slab surface. Tool slab edges round on each side of insert. After concrete has cured, remove inserts and clean groove of loose debris. Contraction joints may be formed by saw cuts as soon after slab finishing without dislodging aggregate.

## 3.2 INSTALLATION OF EMBEDDED ITEMS

A. General: Set and build into work anchorage devices and other embedded items required for other work that is attached to, or supported by, cast-in-place concrete. Use setting drawings, diagrams, instructions and directions provided by suppliers of items to be attached thereto.

B. Edge Forms and Screed Strips for Slabs: Set edge forms or bulkheads and intermediate screed strips for slabs to obtain required elevations and contours in finished slab surface. Provide and secure units sufficiently strong to support types of screed strips by use of strike-off templates or accepted compacting type screeds.

## 3.3 PREPARATION OF FORM SURFACES

A. Clean reused forms of concrete matrix residue, repair and patch as required to return forms to acceptable surface condition.

B. Coat contact surfaces of forms with a form-coating compound before reinforcement is placed.

C. Thin form-coating compounds only with thinning agent of type, and in amount, and under conditions of form-coating compound manufacturer's directions. Do not allow excess form-coating material to accumulate in forms or to come into contact with concrete surfaces against which fresh concrete will be placed. Apply in compliance with manufacturer's instructions.

## 3.4 CONCRETE PLACEMENT

A. Preplacement Inspection: Before placing concrete, inspect and complete formwork installation, reinforcing steel and items to be embedded or cast-in. Notify other crafts to permit installation of their work; cooperate with other trades in setting such work. Moisten wood forms immediately before placing concrete where form coatings are not used.

B. Notify Architect, Engineer, Owner/PM, and testing laboratory a minimum of 48 hours prior to commencement of concreting operations.

C. Coordinate the installation of joint materials and moisture barriers with placement of forms and reinforcing steel.

D. Comply with ACI 304, Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete, and as herein specified.

1. Do not place concrete, under any circumstances, except in presence of testing laboratory.

2. Unless protection is provided, do not place concrete in rain, sleet, or snow.

3. Maximum height of concrete free fall is 5 feet. Where longer drops are necessary, use a chute, tremie or other approved conveyance to assist the concrete into place without separation. Do not place directly into any excavations, including piers, where water is standing. If the place of deposit cannot be successfully pumped dry, place through a tremie with its outlet end near the bottom of the place of deposit.

4. Regulate rate of placement so concrete remains plastic and flows into position.

5. Deposit concrete continuously or in layers of such thickness that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as herein specified. Deposit concrete as nearly as practicable to its final location to avoid segregation.

6. Placing Concrete in Forms: Deposit concrete in forms in horizontal layers not deeper than 24" and in a manner to avoid inclined construction joints. Where placement consists of several layers, place each layer while preceding layer is still plastic to avoid cold joints.

7. Consolidate placed concrete by mechanical vibrating equipment supplemented by hand-spading, rodding or tamping. Use equipment and procedures for consolidation of concrete in accordance with ACI 309 recommended practices.

8. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations not farther than visible effectiveness of machine. Place vibrators to rapidly penetrate placed layer and at least 6" into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to set. At each insertion limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing segregation of mix.

9. Honeycombing caused by improper consolidation is unacceptable.

10. Placing Concrete Slabs: Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until the placing of a panel or section is completed.

12. Consolidate concrete during placing operations so that concrete is thoroughly worked around reinforcement and other embedded items and into corners.

13. Bring slab surfaces to correct level with straightedge and strikeoff. Use highway straightedges, bull floats or darbies to smooth surface, free of humps or hollows. Do not disturb slab surfaces prior to beginning finishing operations.

14. Maintain reinforcing, inserts, embedded parts, and formed joints in proper position during concrete placement operations.

15. Maintain concrete cover around reinforcing as indicated on drawings.

E. Cold Weather Placement: Do not place concrete when temperature is below 40 degrees F unless cold weather concrete procedures are followed as specified in ACI 306. Calcium chloride shall not be used.

F. Hot Weather Placement: Exercise special care to prevent high temperature in fresh concrete during hot weather in accordance with ACI 305. Use water reducing set retarding admixtures in such quantities as specifically recommended by manufacturer to assure that concrete remains workable and lift lines will not be visible.

G. Bonding: Before depositing any new concrete on or against previously deposited concrete which has partially or entirely set, thoroughly roughen and clean the surfaces of the latter of all foreign matter, scum, and laitance. Retighten forms and re coat the surface of the previously deposited concrete with specified bonding agent per manufacturer's directions.

H. Maintain record of concrete placement. Record date, location, quantity, air temperature and test samples taken.

## 3.5 FINISH OF FORMED SURFACES

A. Rough Form Finish: Provide rough form finish for formed concrete surfaces not exposed-to-view in the finish work and in parking garages unless otherwise indicated. This is the concrete surface having texture imparted by form facing material used, with tie holes and defective areas repaired and patched and fins and other projections exceeding 1/4" in height rubbed down or chipped off.

B. Smooth Form Finish: Provide smooth form finish for formed concrete surfaces exposed-to-view (except parking garage, unless noted otherwise), or that are to be covered with a coating material applied directly to concrete, or a covering material applied directly to concrete, such as waterproofing, dampproofing, painting or other similar system. This is as-cast concrete surface obtained with selected form facing material, arranged orderly and symmetrically with a minimum of seams. Repair and patch defective areas with fins or other projections completely removed and smoothed.

C. Smooth Rubbed Finish: Provide smooth rubbed finish to scheduled concrete surfaces, which have received smooth form finish treatment, not later than one day after form removal. Moisten concrete surfaces and rub with carborundum brick or other abrasive until a uniform color and texture is produced. Do not apply cement grout other than that created by the rubbing process.

D. Grout Cleaned Finish: Provide grout cleaned finish to scheduled concrete surfaces, which have received smooth form finish treatment.

1. Combine one part portland cement to 1-1/2 parts fine sand by volume, and mix with water to consistency of thick paint. Proprietary additives may be used at Contractor's option. Blend standard portland cement and white portland cement, amounts determined by trial patches, so that final color of dry grout will closely match adjacent surfaces.

2. Thoroughly wet concrete surfaces and apply grout to coat surfaces and fill small holes. Remove excess grout by scraping and rubbing with clean burlap. Keep damp by fog spray for at least 36 hours after rubbing.

E. Related Unformed Surfaces: At tops of walls, horizontal offsets surfaces occurring adjacent to formed surfaces, strike-off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.6 SLAB FINISHES

A. Monitoring and Adjustment: Provide continuous cycle of placement, measurement, evaluation and adjustment of procedures to produce slabs within specified tolerances.

B. Set perimeter forms to serve as screed using either optical or laser instruments. For slabs on grade, wet screeds may be used to establish initial grade during strike-off, unless this method proves insufficient to meet required finish tolerances whereby rigid screed guides are to be used. Where wet screeds are used, they shall be placed using grade stakes set by optical or laser instruments. Use rigid screed guides, as opposed to wet screeds, to control strike-off elevation for all types of elevated (non slab-on-grade) slabs. Divide bays into halves or thirds by hard screeds. Adjust as necessary where monitoring of previous placements indicates unshored structural steel deflections to other than a level profile.

C. Place slabs monolithically. Once slab placement commences, complete finishing operations within same day. Slope finished slab to floor drains where they occur, whether shown or not.

D. Use straightedges specifically made for screeding, such as hollow magnesium straightedges or power strike-offs. Do not use pieces of dimensioned lumber. Strike off and screed slab to a true surface at required elevations. Use optical or laser instruments to check concrete finished surface grade after strike-off. Repeat strike-off as necessary. Complete screeding before any excess moisture or bleeding water is present on surface. Do not sprinkle dry cement on the surface.

E. Immediately following screeding, and before any bleed water appears, use a 10 foot wide highway straightedge in a cutting and filling operation to achieve surface flatness. Do not use bull floats or darbys, except that darbying may be allowed for narrow slabs and restricted spaces.

F. Wait until water sheen disappears and surface stiffens before proceeding further. Do not perform subsequent operations until concrete will sustain foot pressure with maximum of 1/4 inch indentation.

G. Scratch Finish: Apply scratch finish to monolithic slab surfaces that are to receive concrete floor topping or mortar setting beds for tile, portland cement terrazzo and other bonded applied cementitious finish flooring material, and as otherwise indicated. After placing slabs, plane surface to tolerance specified below. Slope surfaces uniformly to drains where required. After leveling, roughen surface before final set, with stiff brushes, brooms or rakes.

H. Float Finish: Apply float finish to monolithic slab surfaces to receive trowel finish and other finishes as hereinafter specified, and slab surfaces which are to be covered with membrane or

elastic waterproofing, membrane or elastic roofing, or sand-bed terrazzo, and as otherwise indicated. After screeding, consolidating and leveling concrete slabs, do not work surface until ready for floating. Begin floating when surface water has disappeared or when concrete has stiffened sufficiently to permit operation of power-driven floats, or both. Consolidate surface with power-driven floats, or by hand-floating if area is small or inaccessible to power units. Check and level surface plane to a tolerance as specified below. Cut down high spots and fill low spots. Uniformly slope surfaces to drains. Immediately after leveling, refloat surface to a uniform, smooth, granular texture.

I. Trowel Finish: Apply trowel finish to monolithic slab surfaces to be exposed-to-view, and slab surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile, paint or other thinfilm finish coating system. After floating, begin first trowel finish operation using power-driven trowel. Begin final troweling when surface produces a ringing sound as trowel is moved over surface. Consolidate concrete surface by final hand-troweling operation, free of trowel marks, uniform in texture and appearance, and with a level surface to a tolerance as specified below. Grind smooth surface defects, which would telegraph through applied floor covering system.

J. Trowel and Fine Broom Finish: Where ceramic or quarry tile is to be installed with thin-set mortar, apply trowel finish as specified above, then immediately follow with slightly scarifying surface by fine brooming.

K. Non-Slip Broom Finish: Apply non-slip broom finish to ramps less than 6% exterior concrete platforms, steps and elsewhere as indicated. Immediately after trowel finishing, slightly roughen concrete surface by brooming with fiber bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

L. Rake Finish: Provide a rake finish to all ramps exceeding a 6% slope. Finish shall be applied perpendicular to direction of traffic.

M. Chemical-Hardener Finish: Apply chemical-hardener finish to interior concrete floors where indicated. Apply liquid chemical-hardener after complete curing and drying of the concrete surface. Dilute liquid hardener with water (parts of hardener/water as follows), and apply in 3 coats; first coat, 1/3-strength; second coat, 1/2-strength; third coat, 2/3-strength. Evenly apply each coat and allow 24 hours for drying between coats.

Apply proprietary chemical hardeners, in accordance with manufacturer's printed instructions.

After final coat of chemical-hardener solution is applied and dried, remove surplus hardener by scrubbing and mopping with water.

N. Non-slip Aggregate Finish: Apply non-slip aggregate finish to concrete stair treads, platforms, ramps and elsewhere as indicated on the Architect's or Structural Drawings.

After completion of float finishing, and before starting trowel finish, uniformly spread 25 lb. of dampened non-slip aggregate per 100 sq. ft. of surface. Tamp aggregate flush with surface using a steel trowel, but do not force below surface. After broadcasting and tamping, apply trowel finishing as herein specified.

After curing, lightly work surface with a steel wire brush, or an abrasive stone, and water to expose non-slip aggregate.

O. Colored Wear-Resistant Finish: Provide colored wear-resistant finish to monolithic slab surface indicated.

Apply dry shake materials for colored wear-resistant finish at rate of not less than 60 lbs. per 100 sq. ft., unless greater amount is recommended by material manufacturer.

Immediately following first floating operation, uniformly distribute approximately 2/3 of required weight of dry shake material over concrete surface, and embed by means of power floating. Follow floating operation with second shake application, uniformly distributing remainder of dry shake material at right angles to first application, and embed by power floating.

After completion of broadcasting and floating, apply trowel finish as herein specified. Cure slab surface with curing compound recommended by dry shake hardener manufacturer, waiting up to time period as required by the manufacturer (depending on humidity and drying) before application. Do not use moisture-cover or moisture curing methods.

3.7 CONCRETE FINISH MEASUREMENT AND TOLERANCES

A. Definitions:

1. Flatness (FF) - A measure of a concrete surfaces curvature or deviation from a planar surface. Concrete surfaces that are not flat are wavy or bumpy.

2. Levelness (FL) - A measure of a concrete surfaces tilt or inclination from a horizontal plane. Concrete surfaces that are not level are sloped or tilted.

B. Finished slab flatness (FF) and levelness (FL) values are to comply with the following minimum requirements:

4. Slab on Grade with Trowel Finish:

| | |
|---|---|
| Specified overall value | FF 25 / FL 20 |
| Minimum local value | FF 17 / FL 15 |

5. Unshored Metal Deck and Beam Floor Construction:

| | |
|---|---|
| Specified overall value | FF 20 |
| Minimum local value | FF 15 |

6. "Specified overall value" (SOV) is based on the composite of all measured values in a placement derived in accordance with ASTM E1155.

7. "Minimum local value" (MLV) describes the flatness or levelness below which repair or replacement is required. MLV is based on the results of an individual placement and applies to a minimum local area. Minimum local area boundaries may not cross a construction joint or expansion joint. A minimum local area will be bounded by construction and/or control joints, or by column lines and/or half-column lines, whichever is smaller.

C. Measurement Standard: All floors should be measured for flatness and levelness according to ASTM E 1155 "Standard Test Method for Determining Floor Flatness and Levelness Using the F-Number System".

1. Contractor not experienced in using FF and FL criteria is encouraged to retain the services of a floor consultant to assist with recommendations concerning adjustments to slab thicknesses,

finishing techniques, and procedures on measurements of the finish as it progresses in order to achieve the specific flatness and levelness numbers.

D. Time Period for Measurement and Reporting: Measurement of the finished concrete surface profile for any test section shall be made when requested by the Owner's Representative at his option. All measurements shall be made by the Owner's Testing Laboratory or designated party within 72 hours after completion of finishing operations. The Contractor shall be notified immediately after the measurements of any section are complete and a written report of the floor measurement results shall be submitted within 72 hours after finishing operations are complete. The Contractor shall take immediate action to correct any work that is outside specified tolerances as outlined later in this section.

E. Measuring Equipment: The concrete surface profile shall be measured using equipment manufactured for the purpose such as a laser level or any Type II apparatus (i.e. profileograph, or dipstick) specified in ASTM E1155.

F. Remedial Measures for Slab Finish Construction Not Meeting Specified Tolerances:

1. Application of Remedial Measures.
Remedial measures specified herein are required whenever either or both of the following occur:

a. The composite overall values of FF or FL of the entire floor installation measure less than specified values.

b. Any individual test section measures less than the specified absolute minimum FF or FL value.

2. Modification of Existing Surface:

a. If, in the opinion of the Architect/Engineer or Owner's Representative, all or any portion of the substandard work can be repaired without sacrifice to the appearance or serviceability of the area, then the Contractor shall immediately undertake the approved repair method.

b. The Contractor shall submit for review and approval a detailed work plan of the proposed repair showing areas to be repaired, method of repair and time to effect the repair.

c. Repair method(s), at the sole discretion of the Architect/Engineer or Owner's Representative, may include grinding (floor stoning), planing, retopping with self leveling grout or polymer concrete, or any combination of the above.

d. The Architect/Engineer or Owner's Representative maintains the right to require a test repair section using the approved method of repair for review and approval to demonstrate a satisfactory end product. If, in the opinion of the Architect/Engineer or Owner's Representative, the repair is not satisfactory an alternate method of repair shall be submitted or the defective area shall be replaced.

e. The judgment of the Architect/Engineer or Owner's Representative on the appropriateness of a repair method and its ability to achieve the desired end product shall be final.

f. All repair work shall be performed at no additional cost to the Owner and with no extension to the construction schedule.

3. Removal and Replacement:

a. If, in the opinion of the Architect/Engineer or Owner's Representative, all or any portion of the substandard work cannot be satisfactorily repaired without sacrifice to the appearance or serviceability of the area, then the Contractor shall immediately commence to remove and replace the defective work.

b. Replacement section boundaries shall be made to coincide with the test section boundaries as previously defined.

c. Sections requiring replacement shall be removed by sawcutting along the section boundary lines to provide a neat clean joint between new replacement floor and existing floor.

d. The new section shall be reinforced the same as the removed section and doweled into the existing floor as required by the Engineer. No existing removed reinforcing steel may be used. All reinforcing steel shall be new steel.

e. Replacement sections may be retested for compliance at the discretion of the Architect/Engineer or Owner's Representative.

f. The judgment of the Architect/Engineer or Owner's Representative on the need for replacement shall be final.

g. All replacement work shall be performed at no additional cost to the Owner and with no extension to the construction schedule.

## 3.8 CONCRETE CURING AND PROTECTION

A. General:

1. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Maintain concrete with minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of concrete.

2. Curing shall commence as soon as free water has disappeared from the concrete surface after placing and finishing. The curing period shall be 7 days for all concrete except high early strength concrete, which shall be cured for 3 days minimum, unless test cylinders, made and kept adjacent to the structure and cured by the same methods, are tested with the average compressive strength equal to 70% of the specified 28 day strength. Curing may also be terminated when the temperature of the concrete is maintained at least 50°F for the same length of time that laboratory cured cylinders, representative of the concrete in place, require to achieve 85% of the 28 day compressive strength.

3. Curing shall be in accordance with ACI 308 procedures. Avoid rapid drying at the end of the curing period.

B. Curing Methods: Perform curing of all concrete horizontal and vertical surfaces (including columns, shear walls and basement walls) by one of the methods specified or by combinations thereof, as herein specified. The Contractor shall choose a curing method that is compatible with the requirements for subsequent material usage on the concrete surface.

1. Provide moisture curing by one of the following methods:

a. Keep concrete surface continuously wet by covering with water.

b. Continuous water-fog spray.

c. Covering concrete surface with specified absorptive cover, thoroughly saturating cover with water and keeping continuously wet. Place absorptive cover to provide coverage of concrete surfaces and edges, with 4" lap over adjacent absorptive covers.

2. Provide moisture-cover curing as follows: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width with sides and ends lapped at least 3" and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Provide curing/hardener or liquid membrane forming curing compound to interior slabs with resilient flooring, carpet over cushion, or left exposed; and to exterior slabs, walks and curbs, as follows:

Apply specified compound to concrete slabs as soon as final finishing operations are complete (within 2 hours). Apply uniformly in continuous operation by power-spray or roller in accordance with manufacturer's directions. Do not allow to puddle. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

Do not use membrane curing compounds on surfaces which are to be covered with coating material applied directly to concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, flooring (such as ceramic or quarry tile, glue down carpet), painting and other coatings and finish materials, unless otherwise acceptable to the Architect.

Use only clear curing compounds for exposed interior slabs and all exterior concrete.

C. Curing Formed Surfaces: Where wooden forms are used, cure formed concrete surfaces, including undersides of beams, supported slabs and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. When forms are removed, continue curing by methods specified above, as applicable.

D. Curing Unformed Surfaces: Cure unformed surfaces, such as slabs, floor topping and other flat surfaces by application of appropriate curing compound.

Final cure concrete surfaces to receive liquid floor hardener or finish flooring by use of moisture-retaining cover, unless otherwise directed.

## 3.9 HOT WEATHER CONCRETING

A. Definition:

1. Conditions warranting hot weather concreting practices are defined as any combination of high air temperature, low relative humidity and wind velocity tending to impair the quality of fresh or hardened concrete or otherwise result in abnormal properties.

2. The maximum acceptable concrete temperature at the truck discharge point shall be 95°F.

B. Specification: Hot weather concreting practices required to limit the concrete temperature at the truck discharge point to 95°F or lower shall be followed according to ACI 305 "Hot Weather Concreting."

C. Records: Under hot weather conditions, the Contractor shall keep records of outside air temperature, concrete temperature at truck discharge and general weather conditions.

D. Hot Weather Concreting Requirements: The following items, all or in part as required, should be followed to limit the concrete temperature to 95°F or lower:

1. Design the concrete mixes specifically for hot weather conditions replacing some cement with fly ash or other pozzolan and using a water reducing retarding admixture (ASTM C 494 Type D).
2. Use the largest size and amount of coarse aggregate compatible with the job.
3. Use sunshades and/or windbreaks.
4. Delay construction of indoor slabs-on-grade until the walls and roof are constructed.
5. Cool and shade aggregate stockpiles.
6. Use ice as part of the mixing water or cool the water with liquid nitrogen.
7. Limit the number of revolutions at mixing speed to 125 maximum.
8. Paint mixers and storage bins or silos white to minimize heat absorption.
9. Reduce time between mixing and placing as much as possible.
10. Do not add water to ready-mixed concrete at the job site unless it is part of the amount required initially for the specified water-cement ratio and the specified slump.
11. Schedule concrete placement for early morning, late afternoon, or night.
12. Have all forms, equipment and workers ready to receive and handle concrete.
13. Maintain one standby vibrator for every three vibrators used.
14. Keep all equipment cool by spraying with water including chutes, conveyors, pump lines, tremies, reinforcement and buggies.
15. Dampen the subgrade and side forms with cool water.

16. Protect slab concrete at all stages against undue evaporation by applying a fog spray or mist above the surface or applying a monomolecular film. Where high temperatures and/or placing conditions dictate, use water-reducing retarding admixture (Type D) in lieu of the water-reducing admixture (Type A) as directed by the Owner's Testing Laboratory.
17. Provide continuous curing, preferably with water, during the first 24 hours using wet burlap, cotton mats, continuous spray mist, or by applying a curing compound meeting ASTM C 309. Continue curing for 3 days minimum.
18. Spray exteriors of forms to keep them cool.
19. As soon as possible, loosen forms and run water down the inside. When forms are removed, provide a wet cover to newly exposed surfaces.

## 3.10 COLD WEATHER CONCRETING

A. Definition:

1. Concrete shall not be placed on any day when the outside air temperature is 40°F or less and falling unless cold weather concreting practices are followed as specified below.

2. Cold weather concreting practices should be followed whenever the mean daily temperature drops below 40°F for more than three successive days.

3. The temperature of concrete mixed and delivered to the job site shall conform to the following requirements:

| Air Temperature | Min. Concrete Temperature |
|---|---|
| Above 30°F | 60°F |
| 0°F to 30°F | 65°F |
| Below 0°F | 70°F |

4. The minimum temperature of concrete during placement and curing shall be 55°F.

5. The maximum concrete temperature heated by artificial means at point of placement shall not exceed 90°F.

B. Specification: Cold weather concreting practices required to limit the concrete temperatures as specified above shall be followed according to ACI 306R-78 "Cold Weather Concreting".

C. Records: Under cold weather conditions, the Contractor shall keep records of outside air temperature, concrete temperature as placed and general weather conditions.

D. Cold Weather Concreting Requirements: The following items, all or in part as required, should be followed to assure acceptable concrete in cold weather conditions:

1. Design the concrete mix suitable for cold weather. Use air entrainment and obtain high early strength by using a higher cement content, a high early strength cement (Type III), or an accelerator (ASTM C 494 Type C and E).
2. Protect the concrete during curing period using insulating blankets, insulated forms, enclosures and/or heaters.
3. Concrete cured in heated enclosures shall have heaters vented to prevent exposure of concrete and workmen to noxious gases.
4. Frozen subgrade shall be thawed prior to concrete placement and snow and ice shall be removed from forms.
5. Concrete shall be protected and cured at 55°F for three days minimum if normal concrete (Type I cement) is used and for two days minimum if high early strength concrete (concrete with Type III cement, 100 pounds cement added per cubic yard concrete, or an accelerator added).
6. Concrete not loaded during construction shall be protected a minimum of 3 days for normal concrete and 2 days for high early strength concrete to obtain safe form stripping strength. Concrete fully loaded during construction shall be protected for whatever time period is required to obtain the required strength as determined by nondestructive strength tests (Windsor probe, Swiss Hammer Test) on the in-place concrete.
7. Heat the mixing water and then blend hot and cold water to obtain concrete no more than 10°F above the required temperature.
8. Heat the aggregates by circulating steam in pipes placed in the storage bins for air temperatures consistently below 32°F. When either water or aggregate is heated to over

140°F combine them in the mixer first to obtain a maximum temperature of the mixture not to exceed 140°F in order to prevent flash set of the concrete.

9. Uniformly thaw aggregates far in advance of batching to prevent moisture variations in the stockpile.
10. Cover warmed stockpiles with tarps to retain heat.
11. Place air entraining admixture in the batch after the water temperature has been reduced by mixing with cooler solid materials.
12. Use wind screens to protect concrete from rapid cooling.
13. Place vertical pump lines inside the building, if possible, for concrete being pumped.
14. Maintain artificial heat as low as possible to reduce temperature stresses during cooling.
15. Avoid water curing of concrete except for parking garage structures. Apply the required curing compound to unformed surfaces as soon as possible to prevent drying of concrete from heated enclosures.
16. Delay form stripping as long as possible to help prevent drying from heated enclosures and to reduce damage to formed surfaces caused by premature stripping.
17. Provide triple thickness of insulating materials at corners and edges vulnerable to freezing.
18. Wrap protruding reinforcing bars with insulation to avoid heat drain from the warm concrete.
19. Gradually reduce the heat at the end of the heating period to reduce likelihood of thermal shock.

## 3.11 MISCELLANEOUS CONCRETE ITEMS

A. Filling-In: Fill-in holes and openings left in concrete structures for passage of work by other trades, unless otherwise shown or directed, after work of other trades is in place. Mix, place and cure concrete as herein specified, to blend with inplace construction. Provide other miscellaneous concrete filling shown or required to complete work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and steel-troweling surfaces to a hard, dense finish with corners, intersections and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations, as shown on drawings. Set anchor bolts for machines and equipment to template at correct elevations, complying with certified diagrams or templates of manufacturer furnishing machines and equipment.

D. Grout base plates and foundations as indicated, using specified non-shrink grout. Use non-metallic grout for exposed conditions unless otherwise indicated.

E. Steel Pan Stairs: Provide concrete fill for steel pan stair treads and landings and associated items. Cast-in safety inserts and accessories as shown on drawings. Screed, tamp and finish concrete surfaces as scheduled.

## 3.12 CONCRETE SURFACE REPAIRS

A. Definition - Defective Areas:

1. Formed Surfaces: Concrete surfaces requiring repairs shall include all honeycombs, rock pockets and voids exceeding 1/4" in any dimension, holes left by tie rods or bolts, cracks in excess of 0.01" and any other defects that affect the durability or structural integrity of the concrete.

2. Unformed Surfaces: Concrete surfaces requiring repair shall include all surface defects such as crazing, cracks in excess of 0.01" wide or cracks which penetrate to reinforcement or through the member, popouts, spalling and honeycombs.

B. Classification:

1. Structural Concrete Repair: Major defective areas in concrete members that are load carrying (such as shear walls, beams, joists and slabs), are highly stressed, and are vital to the structural integrity of the structure shall require structural repairs. Structural concrete repairs shall be made using a two part epoxy bonder and/or epoxy mortar. Location of structural concrete repairs shall be determined by the Engineer.

2. Cosmetic Concrete Repair: Defective areas in concrete members that are non-load carrying and minor defective areas in load carrying concrete members shall require cosmetic concrete repair. Cosmetic concrete repairs may be made using a non-epoxy non-shrink patching mortar and bonding agent. The location of cosmetic concrete repair required shall be determined by the Engineer. Cosmetic concrete repair in exposed-to-view surfaces will require Architect's approval prior to patching operation.

3. Slab Repairs: High areas in concrete slabs shall be repaired by grinding after concrete has cured at least 14 days. Low areas shall be filled using self-leveling mortars. Repair of slab spalls and other surface defects shall be made using epoxy products as specified above and as determined by the Engineer.

3.13 QUALITY CONTROL TESTING DURING CONSTRUCTION

See Testing Laboratory Services section of these Specifications 01 45 29 for concrete materials and cast-in-place concrete inspection and test requirements.

END OF SECTION 03 30 00

**SECTION 31 63 29**

**DRILLED CONCRETE PIERS AND SHAFTS**

PART 1 - GENERAL

1.1 SUMMARY

A. Related Documents: Genaeral and Supplemental Conditions of the Contract, Division 1 – General Requirements, and Drawings are applicable to this Section.

B. Section Includes:
1. Bored, straight shaft cast-in-place concrete piers with steel shaft liners as required to retard groundwater.

C. Unit Prices:
1. Work specified in this Section is affected by the requirements of Section 01 22 00.

1.2 SUBMITTALS

A. Submit shop drawings under provisions of Section 01 33 00. Indicate details and schedules of pier installation, identify recommended pier lengths and diameters to suit design loads, and reinforcing requirements.

B. Submit drilling logs showing identification marks, shaft diameter, bell diameter, bottom elevation, top elevation, description of bearing strata, nature and location of obstructions, and wall conditions during drilling and concrete placement.

1.3 INSPECTION CONTROL

A. Notify Architect, Owner/PM, and testing laboratory when drilling is to begin.

B. Testing laboratory will be paid in accordance with Section 01 45 00.

1.4 DRILLED PIER RECORD

A. Drilled Piers complete, to depths indicated, including drilling, concrete, reinforcement, and casing, if required, are a part of the base bid contract amount.

B. Keep a complete record showing the actual elevation of the bottom of each drilled pier and the difference in linear feet between actual and estimated depths. The difference between the accumulated total of lesser and greater depths from the estimated depths shall be used to determine the total amount of variation. Total variation times the Unit Price shall be used to adjust the Contract Amount. Refer to Section 01 22 00.

1.5 UNIT PRICES

A. Refer to Bid Form.

B. Actual Pier Length: Determined by length of piers identified in Project Record Documents.

C. Adjustments in Contract Price will be made due to changes in number and length of piers, based on unit prices established in the Agreement.

1.6 QUALITY ASSURANCE

A. Contractor Qualifications: Minimum 3 years experience in drilled pier construction with similar subsurface materials, pier sizes and special techniques required.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Shaft Liners: ASTM A 252, Grade T1; single length straight steel pipe; of diameters and weight per lineal foot as required for intended use.

B. Concrete Materials and Mix: Specified in Section 03 30 00.

C. Reinforcement: Specified in Section 03 20 00.

D. Equipment: Appropriate to dewater excavated shaft.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify site conditions will support equipment for performance of pier placement operations.

3.2 PREPARATION

A. Use placement method which will not cause damage to nearby structures.

B. Protect structures near the Work from damage.

3.3 INSTALLATION

A. Construct piers in accordance with ACI 336.1, and as specified herein.

B. Drill concentric pier shafts. Drill pier holes with a power auger foundation drilling rig especially designed for that purpose. Base Bids on drilling to Bid depths shown. Accurately locate foundation pier holes, and drill to size and soil strata shown on Drawings.

C. Where required to restrict water infiltration, place steel shaft liners immediately after drilling and inspection of pier shafts. Jack firmly in place.

D. Clean pier bottom of loose material immediately after drilling and placing shaft liners.

E. Allow inspection of pier shafts prior to reinforcing steel and concrete placement. Prevent foreign matter from falling into shaft.

3.4 PLACING PIER REINFORCEMENT

A. Clean reinforcing cage of foreign materials which will destroy or reduce the bond with concrete.

A. Install reinforcing cage indicated on Drawings as follows:
   1. Support cage off bottom of hole the distance indicated on Drawings.
   2. Firmly secure the cage in place, free of contact with sides of pier hole. Provide positive means to maintain the proper clear distance on all sides.

B. Provide dowels or anchor bolts in piers as indicated on Drawings. Provide positive means of support for dowels or anchor bolts prior to concreting. Stabbing of dowels or anchor bolts into fresh concrete is not acceptable.

3.5 CONCRETING

A. Maximum allowable water in hole the time of concreting is 3 inches.

B. Place concrete to fill holes drilled.

C. The method used for placing concrete shall avoid segregation of concrete and splashing against reinforcing cage and sides of pier hole. Provide adequate runways, chutes, tremies, and other means of conveying concrete into place. Use chutes, tremies, or bottom dump trucks for placing concrete. Thoroughly vibrate the top five (5) feet of concrete in shaft and remove excess water.

D. Place concrete in shaft excavation as soon as practicable after drilling, seating, and cleaning has been completed. Concrete is to be placed within 8 hours of shaft excavation.

E. During removal of temporary casing from hole during concrete operation, exercise extreme care in removal in order to ensure that the hydrostatic head of plastic concrete is, at all times, greater than hydrostatic head of surrounding ground water, and that no rotation or jerking of casing is permitted during withdrawal. Monitor the elevations of concrete and rebar cage as casing is extracted to observe that no sudden rise occurs indicating concrete or cage hanging up in the casing.

F. If water in shaft exceeds 3 inches, place concrete under water as follows:
   1. Place concrete using flexible pipe (tremie or concrete pump hose) with adequate strength, weight, and water tightness to perform desired operation and with a diameter approximately eight times the size of the largest aggregate.
   2. Proportion concrete mix as follows:
      a. Slump 6 to 9 inches.
      b. Water/cement ratio: .44 (5 gallon / sack of cement).
      c. Admixtures: water reducing, set controlling conforming to ASTM C494 and air-entrainment conforming to ASTM C260.
   3. Deposit concrete in a slow, smooth and continuous operation.
   4. Plug end of pipe with adequate seal before lowering into water. Exercise care to assure concrete does not segregate as it pushes water out of the bottom of the hole.
   5. Bottom of pipe shall remain in plastic concrete at all times after placement has begun. When concrete flow must be stopped for a short time, lower pipe deeper into plastic concrete.
   6. Vibration, agitation and adverse movement of pipe in plastic concrete is not permitted. Provide adequate equipment to lift pipe from excavation.

7. Placement is to be controlled by qualified personnel through continuous observation.

3.6 CONCRETE TESTING

A. Perform concrete testing under provisions of Section 01 45 00.

3.7 TOLERANCES

A. Maximum permissible variation of location: Not more than 1/24th of shaft diameter or 3 inches, whichever is less.

B. Shafts out of Plumb: Not more than 12.5 percent of shaft diameter or 2% of full depth, whichever is less.

C. Concrete cut-off elevation: Plus 1 inch to minus 3 inches.

D. Shaft and bell diameters at any cross section: Within 1 inch of specified dimensions.

3.8 FIELD QUALITY CONTROL

A. Accurately record the following information immediately upon completion of drilling.
1. Sizes, lengths, and locations of piers.
2. Sequence of placement.
3. Final base and top elevations.
4. Deviation from indicated locations.
5. Depth of penetration into substrate.

B. Make continuous inspections of pier drilling operation to determine that the proper strata is being obtained and that shafts are properly clean and dry before placing concrete.
1. Maintain a pier log for each pier showing design requirements and actual in place size and depth.
2. Verify that the excavation is of the proper size and adequately clean and dry.
3. Verify that each shaft is founded at a satisfactory depth and at the proper bearing strata.
4. Verify that the reinforcing and concrete are properly placed in accordance with other testing provisions specified herein.
5. Notify Architect of soil or water conditions require casing of piers.

C. Inspection reports of pier drilling shall contain the following:
1. Pier Mark.
2. Pier Depth.
3. Depth of penetration into bearing strata.
4. Plumbness deviation.
5. Description of unusual conditions encountered, including groundwater.
6. Record of deviations from contract document requirements.

3.9 NON-CONFORMING PIERS

A. Non-conforming Piers: Piers that are placed out of position or are damaged.

B. Provide additional piers or supplement piers to meet specified requirements. Consult with Engineer before proceeding with any corrective or remedial measures.

3.10 UNACCEPTABLE PIERS

A. Unacceptable Piers: Piers that fail, are placed out of position, are below elevations, or are damaged.

B. Provide additional piers or replace piers failing to conform to specified requirements.

C. Receive Engineer's approval prior to taking any corrective action.

**END OF SECTION 31 63 29**

# SECTION 04065

# MORTAR AND MASONRY GROUT

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Mortar for masonry.

B. Grout for masonry.

### 1.02 RELATED SECTIONS

A. Section 04720 - Cast Stone.

B. Section 04810 - Unit Masonry Assemblies: Installation of mortar and grout.

C. Section 04851 - Cut Stone Veneer.

### 1.03 REFERENCES

A. ACI 530/ASCE 5/TMS 402 - Building Code Requirements For Masonry Structures; American Concrete Institute International; 2002.

B. ACI 530.1/ASCE 6/TMS 602 - Specification for Masonry Structures; American Concrete Institute International; 2002.

C. ASTM C 144 - Standard Specification for Aggregate for Masonry Mortar; 2003.

D. ASTM C 150 - Standard Specification for Portland Cement; 2002a.

E. ASTM C 207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2004.

F. ASTM C 270 - Standard Specification for Mortar for Unit Masonry; 2003b.

G. ASTM C 404 - Standard Specification for Aggregates for Masonry Grout; 2003.

H. ASTM C 476 - Standard Specification for Grout for Masonry; 2002.

### 1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Include design mix and indicate whether the Proportion or Property specification of ASTM C 270 is to be used. Also include required environmental conditions and admixture limitations.

### 1.05 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/ASCE 5/TMS 402 and ACI 530.1/ASCE 6/TMS 602, except where exceeded by requirements of the contract documents.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Maintain packaged materials clean, dry, and protected against dampness, freezing, and foreign matter.

### 1.07 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

## PART 2 PRODUCTS

### 2.01 MATERIALS`

A. Portland Cement: ASTM C 150, Type I - Normal; white.

B. Hydrated Lime: ASTM C 207, Type S.

C. Mortar Aggregate: ASTM C 144.

D. Grout Aggregate: ASTM C 404.

E. Pigments for Colored Mortar: Iron or chromium oxides with demonstrated stability and colorfastness.
   1. Colors: As required to match existing mortar.

F. Water: Clean and potable.

G. Bonding Agent: Latex type.

### 2.02 MORTAR MIXES

A. Mortar for Unit Masonry: ASTM C 270, Property Specification.
   1. Masonry below grade and in contact with earth: Type S.
   2. Exterior, loadbearing masonry: Type N.
   3. Exterior, non-loadbearing masonry: Type N.
   4. Interior, loadbearing masonry: Type N.
   5. Interior, non-loadbearing masonry: Type O.
   6. Pointing mortar: Type N with maximum 2 percent ammonium stearate or calcium stearate per cement weight.

B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

### 2.03 MORTAR MIXING

A. Thoroughly mix mortar ingredients using mechanical batch mixer, in accordance with ASTM C 270 and in quantities needed for immediate use.

B. Maintain sand uniformly damp immediately before the mixing process.

C. Add mortar color in accordance with manufacturer's instructions. Provide uniformity of mix and coloration.

D. Do not use anti-freeze compounds to lower the freezing point of mortar.

E. If water is lost by evaporation, re-temper only within two hours of mixing.

F. Use mortar within two hours after mixing at temperatures of 90 degrees F, or two-and-one-half hours at temperatures under 40 degrees F.

### 2.04 GROUT MIXES

A. Bond Beams and Lintels: 3,000 psi strength at 28 days; 8-10 inches slump; mix in accordance with ASTM C 476.
   1. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
   2. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

B. Engineered Masonry: 3,000 psi strength at 28 days; 8-10 inches slump; mix in accordance with ASTM C 476.
   1. Fine grout for spaces with smallest horizontal dimension of 2 inches or less.
   2. Coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

### 2.05 GROUT MIXING

A. Thoroughly mix grout ingredients in quantities needed for immediate use in accordance with ASTM C 476 for fine and coarse grout.

## PART 3 EXECUTION

### 3.01 PREPARATION

A. Apply bonding agent to existing concrete surfaces.

B. Plug clean-out holes for grouted masonry with brick masonry units. Brace masonry to resist wet grout pressure.

### 3.02 INSTALLATION

A. Install mortar and grout to requirements of section(s) in which masonry is specified.

B. Work grout into masonry cores and cavities to eliminate voids.

C. Do not install grout in lifts greater than 16 inches without consolidating grout by rodding.

D. Do not displace reinforcement while placing grout.

E. Remove excess mortar from grout spaces.

### 3.03 GROUTING

A. Perform all grouting by means of low-lift technique. Do not employ high-lift grouting.

B. Low-Lift Grouting:
   1. Limit height of pours to 12 inches.
   2. Limit height of masonry to 16 inches above each pour.
   3. Pour grout only after vertical reinforcing is in place; place horizontal reinforcing as grout is poured. Prevent displacement of bars as grout is poured.
   4. Place grout for each pour continuously and consolidate immediately; do not interrupt pours for more than 1-1/2 hours.

**END OF SECTION**

# SECTION 04720

# CAST STONE

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Architectural cast stone.

B. Units required are:
   1. Exterior wall units.
   2. Interior units.

### 1.02 RELATED SECTIONS

A. Section 04065 - Mortar and Masonry Grout: Mortar for setting cast stone.

B. Section 04810 - Unit Masonry Assemblies: Installation of cast stone in conjunction with masonry.

C. Section 07900 - Joint Sealers: Materials and execution methods for sealing soft joints in cast stone work.

D. Section 04851 - Cut Stone Veneer.

### 1.03 REFERENCES

A. ACI 318 - Building Code Requirements for Reinforced Concrete; 2002.

B. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2002.

C. ASTM A 185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete; 2002.

D. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2004.

E. ASTM C 33 - Standard Specification for Concrete Aggregates; 2003.

F. ASTM C 150 - Standard Specification for Portland Cement; 2002a.

G. ASTM C 270 - Standard Specification for Mortar for Unit Masonry; 2003b.

H. ASTM C 494/C 494M - Standard Specification for Chemical Admixtures for Concrete; 2004.

I. ASTM C 642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete; 1997.

J. ASTM C 1364 - Standard Specification for Architectural Cast Stone; 2003.

### 1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Manufacturer's Qualification Data: Documentation showing compliance with specified requirements.

C. Product Data: Test results of cast stone components made previously by the manufacturer.

D. Shop Drawings: Include elevations, dimensions, layouts, profiles, cross sections, reinforcement, exposed faces, arrangement of joints, anchoring methods, anchors, and piece numbers.

E. Mortar Color Selection Samples.

F. Verification Samples: Pieces of actual cast stone components not less than 12 inches square, illustrating range of color and texture to be anticipated in components furnished for the project.

G. Full-Size Samples: Units required for mock-up.

H. Source Quality Control Test Reports.

**1.05 QUALITY ASSURANCE**

A. Manufacturer Qualifications: A firm with a minimum of 5 years of experience in producing cast stone of the types required for project and:
   1. Adequate plant capacity to furnish quality, sizes, and quantity of cast stone required without delaying progress of the work.
   2. Products previously produced by plant and exposed to weather that exhibit satisfactory appearance.

B. Mock-Up: Provide full size cast stone components for installation in mock-up of exterior wall.
   1. Approved mock-up will become standard for appearance and workmanship.
   2. Mock-up may not remain as part of the completed work.
   3. Remove mock-up not incorporated into the work and dispose of debris.

C. Source Quality Control: Test compressive strength and absorption of specimens selected at random from plant production.
   1. Test in accordance with ASTM C 642.
   2. Select specimens at rate of 3 per 500 cubic feet, with a minimum of 3 per production week.
   3. Submit reports of tests by independent testing agency, showing compliance with requirements.

**1.06 DELIVERY, STORAGE, AND HANDLING**

A. Deliver cast stone components secured to shipping pallets and protected from damage and discoloration. Protect corners from damage.

B. Number each piece individually to match shop drawings and schedule.

C. Store cast stone components and installation materials in accordance with manufacturer's instructions.

D. Store cast stone components on pallets with nonstaining, waterproof covers. Ventilate under covers to prevent condensation. Prevent contact with dirt.

E. Protect cast stone components during handling and installation to prevent chipping, cracking, or other damage.

F. Store mortar materials where contamination can be avoided.

G. Schedule and coordinate production and delivery of cast stone components with unit masonry work to optimize on-site inventory and to avoid delaying the work.

**PART 2 PRODUCTS**

**2.01 ARCHITECTURAL CAST STONE**

A. Cast Stone: Architectural concrete product manufactured to simulate appearance of natural limestone, complying with ASTM C 1364.
   1. Compressive Strength: As specified in ASTM C 1364; calculate strength of pieces to be field cut at 80 percent of uncut piece.
   2. Freeze-Thaw Resistance: Demonstrated by field experience.
   3. Surface Texture: Fine grained texture, with no bugholes, air voids, or other surface blemishes visible from distance of 20 feet.

4. Color: Selected by Architect from manufacturer's full range.
5. Remove cement film from exposed surfaces before packaging for shipment.

B. Shapes: Provide shapes indicated on drawings.
1. Variation from Any Dimension, Including Bow, Camber, and Twist: Maximum of plus/minus 1/8 inch or length divided by 360, whichever is greater, but not more than 1/4 inch.
2. Unless otherwise indicated on drawings, provide:
a. Wash or slope of 1:12 on exterior horizontal surfaces.
b. Drips on projecting components, wherever possible.
c. Raised fillets at back of sills and at ends to be built in.

C. Reinforcement: Provide reinforcement as required to withstand handling and structural stresses; comply with ACI 318.

**2.02 MATERIALS**

A. Portland Cement: ASTM C 150.
1. For Units: Type I or II, white.
2. For Mortar: Specified in Section 04065.

B. Coarse Aggregate: ASTM C 33, except for gradation; granite, quartz, or limestone.

C. Fine Aggregate: ASTM C 33, except for gradation; natural or manufactured sands.

D. Admixtures: ASTM C 494/C 494M.

E. Water: Potable.

F. Reinforcing Bars: ASTM A 615/A 615M deformed bars, galvanized or epoxy coated.

G. Steel Welded Wire Reinforcement: ASTM A 185, galvanized or epoxy coated.

H. Embedded Anchors, Dowels, and Inserts: ASTM A 123/A 123M hot-dip galvanized steel, of type and size as required for conditions.

I. Shelf Angles and Similar Structural Items: Hot-dip galvanized steel per ASTM A123/A 123M, of shapes and sizes as required for conditions.

J. Mortar: Specified in Section 04065.

K. Sealant: As specified in Section 07900.

L. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
1. Product: Mortar Net
2. Manufacturer: Mortar Net USA, LTD; www.mortarnet.com

M. Weep/Cavity Vents: Plastic tubing.
1. Acceptable Manufacturer: Hohmann & Barnard, Inc; www.h-b.com
a. Acceptable Product: Weep Hole No. 343.
b. Substitutions: See Section 01600 - Product Requirements.

N. Cleaner: General-purpose cleaner designed for removing mortar and grout stains, efflorescence, and other construction stains from new masonry surfaces without discoloring or damaging masonry surfaces; approved for intended use by cast stone manufacturer and by cleaner manufacturer for use on cast stone and adjacent masonry materials.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Examine construction to receive cast stone components. Notify Architect if construction is not acceptable.

B. Do not begin installation until unacceptable conditions have been corrected.

### 3.02 INSTALLATION

A. Install cast stone components in conjunction with masonry, complying with requirements of Section 04810.

B. Mechanically anchor cast stone units indicated; set remainder in mortar.

C. Setting:
   1. Drench cast stone components with clear, running water immediately before installation.
   2. Set units in a full bed of mortar unless otherwise indicated.
   3. Fill vertical joints with mortar.
   4. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.

D. Joints: Make all joints 3/8 inch, except as otherwise detailed.
   1. Rake mortar joints 3/4 inch for pointing. Scrub face of each stone to remove excess mortar before it sets.
   2. Point joints with mortar in layers 3/8 inch thick and tool to Architect approved flush profile.
   3. Leave the following joints open for sealant:
      a. Head joints in top courses, including copings, parapets, cornices, sills, and steps.
      b. Joints in projecting units.
      c. Joints between rigidly anchored units, including soffits, panels, and column covers.
      d. Joints below lugged sills and stair treads.
      e. Joints below ledge and relieving angles.
      f. Joints labeled "expansion joint".

E. Sealant Joints: Install sealants as specified in Section 07900.

F. Installation Tolerances:
   1. Variation from Plumb: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet or more.
   2. Variation from Level: Not more than 1/8 inch in 10 feet or 1/4 inch in 20 feet, or 3/8 inch maximum.
   3. Variation in Joint Width: Not more than 1/8 inch in 36 inches or 1/4 of nominal joint width, whichever is less.
   4. Variation in Plane Between Adjacent Surfaces (Lipping): Not more than 1/16 inch difference between planes of adjacent units or adjacent surfaces indicated to be flush with units.

### 3.03 CLEANING AND PROTECTION

A. Repair chips and other surface damage noticeable when viewed in direct daylight at 20 feet.
   1. Repair with matching touchup material provided by the manufacturer and in accordance with manufacturer's instructions.
   2. Repair methods and results subject to Architect 's approval.

B. Clean cast stone components as work progresses; remove mortar fins and smears before tooling joints.

C. Protect from splashing by mortar and other damage.

**END OF SECTION**

**SECTION 04730**

**THIN-SET STONE VENEER**

1.1 PROJECT CONDITIONS

A. Environmental Requirements:

1. Minimum air temperature of 40 degrees F (4 degrees C) prior to, during, and for 48 hours after completion of work; and
2. Cold Weather Requirements: IMIAC (International Masonry Industry All-Weather Council) - Recommended Practices and Guide Specifications for Cold Weather Masonry Construction.

1.2 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, handle, and protect materials in accordance with Section 01600.

1. Store mortar materials on pallets in dry place.
2. Protect materials from rain, moisture, and freezing temperatures.
3. Protect reinforcement and accessories from elements.

## PART 2 PRODUCTS

2 **STONE :** Blackson Brick BBCO Palamino Blend

3




4 MORTAR COLOR. Portland Lime & Sand / SM 250 Antique White

A. Mixing: Use thinset with acrylic additive in accordance with thinset manufacturer's recommendation.
1. Thoroughly mix mortar and grout ingredients in quantities needed for immediate use. Mix grout to ASTM C 270, Type S proportions and mortar to ASTM C 270, Type S requirements.

A. Setting Accessories:

2. Fasteners: Coated 1-1/2 inch nails, staples, or screws of type and for spacing as recommended by simulated stone manufacturer.
3. Cleaner: Nonacid cleaner as recommended by simulated stone manufacturer.

## PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Examination: Examine conditions and proceed with work in accordance with Section 01400.
1. Verify that field conditions are acceptable and are ready to receive work.
2. Verify items provided by other Sections of work are properly sized and located.
3. Verify that built-in items are in proper location and ready for roughing into masonry work.
4. Verify correct product prior to installation.
a. Install metal lath if residual coatings are present on substrate.

B. Protect surrounding area from possible damage during installation work.

C. Initiating installation constitutes Installer's acceptance of existing surfaces and substrate.

3.2 APPLICATION

A. Mortar:
1. Apply bonding agent to masonry or concrete substrates in accordance with manufacturer's recommendations.

D. Stone Veneer :

1. Apply 3/8 to 1/2 inch of mortar covering to back of each stone.
2. Place units with uniform mortar joints to match existing.
3. Install outside corner return units with short and long lengths alternated.

E. Plan work to minimize jobsite cutting. Perform necessary cutting with proper tools to provide uniform edges; take care to prevent breaking unit corners or edges.

F. Remove excess mortar; do not allow mortar to dry on face of units.
1. Point and tool joints before mortar has set.
2. Clean and finish joints in accordance with architect's and manufacturer's instructions.

G. Control Joints: Size in accordance with Section 07920 for sealant performance, but in no case larger than adjacent mortar joints in exposed stone units.

H. Expansion Joints: Provide where indicated on Drawings or as recommended by system manufacturer.

I. Built-in Work: As work progresses, build in door and window frames, nailing strips, anchor
bolts, plates, and other items specified in various sections.
1. Build in items plumb and level.

2. Bed anchors of metal door and glazed frames in mortar joints. Fill frame voids solid with mortar.
3. Do not build in organic materials subject to deterioration.

3.3 ADJUSTING

A. Cutting and Fitting: Cut and fit for chases, pipes, conduit, sleeves, and grounds. Cooperate with other sections of work to provide correct size, shape, and location.
   1. Obtain approval prior to cutting or fitting any area not indicated or where appearance or strength of masonry work may be impaired.

3.4 CLEANING AND SEALING

A. Cleaning: Comply with Section 01740.
   1. Remove excess mortar and smears using brush or steel wool.
   2. Replace defective mortar. Match adjacent work.
   3. Clean soiled surfaces with non-acidic solution, acceptable to the stone manufacturer, which will not harm masonry or adjacent materials.
   4. Leave surfaces thoroughly clean and free of mortar and other soiling.
   5. Use nonmetallic tools in cleaning operations.
B. Sealer: Apply sealer to completed surface in accordance with manufacturer's instructions.

**END OF SECTION**

# SECTION 04810

# UNIT MASONRY ASSEMBLIES

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Concrete Block.

B. Reinforcement and Anchorage.

C. Flashings.

D. Lintels.

E. Accessories.

### 1.02 RELATED SECTIONS

A. Section 04065 - Mortar and Masonry Grout.

B. Section 04720 - Cast Stone.

C. Section 04851 - Cut Stone Veneer

D. Section 04900 - Masonry Restoration and Cleaning.

E. Section 05500 - Metal Fabrications: Loose steel lintels.

F. Section 06100 - Rough Carpentry: Nailing strips built into masonry.

G. Section 07115 - Bituminous Dampproofing: Dampproofing parged masonry surfaces.

H. Section 07900 - Joint Sealers: Backing rod and sealant at control and expansion joints.

### 1.03 REFERENCES

A. ACI 530/ASCE 5/TMS 402 - Building Code Requirements for Masonry Structures; American Concrete Institute International; 2002.

B. ACI 530.1/ASCE 6/TMS 602 - Specification For Masonry Structures; American Concrete Institute International; 2002.

C. ASTM A 82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement; 2002.

D. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2003.

E. ASTM A 615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement; 2004.

F. ASTM C 90 - Standard Specification for Loadbearing Concrete Masonry Units; 2003.

G. ASTM C 129 - Standard Specification for Nonloadbearing Concrete Masonry Units; 2003.

H. ASTM C 270 - Standard Specification for Mortar for Unit Masonry; 2003b.

I. ASTM C 476 - Standard Specification for Grout for Masonry; 2002.

J. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 1997a.

### 1.04 QUALITY ASSURANCE

A. Comply with provisions of ACI 530/ASCE 5/TMS 402 and ACI 530.1/ASCE 6/TMS 602, except where exceeded by requirements of the contract documents.

### 1.05 MOCK-UP

A. Mock-up specified in Section 01410 - Approval Mockups.

### 1.06 PRE-INSTALLATION MEETING

A. Convene one week before starting work of this section.

### 1.07 DELIVERY, STORAGE, AND HANDLING

A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

### 1.08 ENVIRONMENTAL REQUIREMENTS

A. Maintain materials and surrounding air temperature to minimum 40 degrees F prior to, during, and 48 hours after completion of masonry work.

B. Maintain materials and surrounding air temperature to maximum 90 degrees F prior to, during, and 48 hours after completion of masonry work.

### 1.09 EXTRA MATERIALS

A. See Section 01600 - Product Requirements, for additional provisions.

## PART 2 PRODUCTS

### 2.01 CONCRETE MASONRY UNITS

A. Concrete Block: Comply with referenced standards and as follows:
   1. Size: Standard units with nominal face dimensions of 16 x 8 inches and nominal depths as indicated on the drawings for specific locations.
   2. Special Shapes: Provide non-standard blocks configured for corners.
   3. Load-Bearing Units: ASTM C 90, normal weight.
      a. Hollow block.
   4. Non-Loadbearing Units: ASTM C 129.
      a. Hollow block.
      b. Lightweight.

### 2.02 MORTAR AND GROUT MATERIALS

A. Mortar and grout: As specified in Section 04065.

### 2.03 REINFORCEMENT AND ANCHORAGE

A. Manufacturers of Joint Reinforcement and Anchors:
   1. Dur-O-Wal: www.dur-o-wal.com.
   2. Hohmann & Barnard, Inc: www.h-b.com.
   3. Masonry Reinforcing Corporation of America: www.wirebond.com.
   4. Substitutions: See Section 01600 - Product Requirements.

B. Reinforcing Steel: ASTM A 615/A 615M Grade 60 (420) deformed billet bars; uncoated.

C. Single Wythe Joint Reinforcement: Truss type; ASTM A 82 steel wire, hot dip galvanized after fabrication to ASTM A 153/A 153M, Class B; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

D. Multiple Wythe Joint Reinforcement: Truss type; fabricated with moisture drip; ASTM A 82 steel wire, hot dip galvanized after fabrication to ASTM A 153/153M, Class B; 0.1483 inch side rods with 0.1483 inch cross rods; width as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage on each exposure.

E. Adjustable Multiple Wythe Joint Reinforcement: Truss type with adjustable ties or tabs spaced at 16 in on center and fabricated with moisture drip; ASTM A 82 steel wire, hot dip galvanized after fabrication to ASTM A 153/153M, Class B; 0.1875 inch side rods with 0.1483 inch cross rods and adjustable components of 0.1875 inch wire; width of components as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from each masonry face.
   1. Vertical adjustment: Not less than 2 inches.

F. Strap Anchors: Bent steel shapes configured as required for specific situations, 1-1/4 in width, 0.105 in thick, lengths as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face, corrugated for embedment in masonry joint, hot dip galvanized to ASTM A 153/A 153M, Class B.

G. Flexible Anchors: 2-piece anchors that permit differential movement between masonry and building frame, sized to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from masonry face.
   1. Steel frame: Crimped wire anchors for welding to frame, 0.25 inch thick, with trapezoidal wire ties 0.1875 inch thick, hot dip galvanized to ASTM A 153/A 153M, Class B.

H. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
   1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing by two fasteners; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
   2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
   3. Vertical adjustment: Not less than 2 inches.

**2.05 FLASHINGS**

A. Specified in Section 07650 – Wall Flashing.

**2.06 ACCESSORIES**

A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
   1. Manufacturers:
      a. Dur-O-Wal: www.dur-o-wal.com.
      b. Hohmann & Barnard, Inc: www.h-b.com.
      c. Masonry Reinforcing Corporation of America: www.wirebond.com.
      d. Substitutions: See Section 01600 - Product Requirements.

B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; maximum lengths available.
   1. Manufacturers:
      a. Dur-O-Wal: www.dur-o-wal.com.
      b. Hohmann & Barnard, Inc: www.h-b.com.
      c. Masonry Reinforcing Corporation of America: www.wirebond.com.
      d. Substitutions: See Section 01600 - Product Requirements.

C. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
   1. Product: Mortar Net
   2. Manufacturer: Mortar Net USA, LTD; www.mortarnet.com

D. Building Paper: ASTM D 226, Type I ("No.15") asphalt felt.

E. Nailing Strips: Preservative treated softwood, as specified in Section 06100.

F. Weep/Cavity Vents: Louvered plastic tubing.
   1. Acceptable Manufacturer: Hohmann & Barnard, Inc; www.h-b.com
      a. Acceptable Product: Weep Hole No. 343 Wilko Weep Hole.
      b. Substitutions: See Section 01600 - Product Requirements.

G. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

### 2.07 MORTAR AND GROUT MIXES

A. Specified in Section 04065 - Mortar and Masonry Grout.

B. Grout: ASTM C 476. Consistency required to fill completely volumes indicated for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive masonry.

B. Verify that related items provided under other sections are properly sized and located.

C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

### 3.02 PREPARATION

A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

### 3.03 COURSING

A. Establish lines, levels, and coursing indicated. Protect from displacement.

B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.

C. Concrete Masonry Units:
   1. Bond: Running.
   2. Coursing: One unit and one mortar joint to equal 8 inches.
   3. Mortar Joints: Concave.

### 3.04 PLACING AND BONDING

A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.

B. Lay hollow masonry units with face shell bedding on head and bed joints.

C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.

D. Remove excess mortar and mortar smears as work progresses.

E. Interlock intersections and external corners.

F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.

G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

H. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.

I. Isolate masonry partitions from vertical structural framing members with a control joint.

J. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

**3.05 WEEP/CAVITY VENTS**

A. Install weep/cavity vents in veneer and cavity walls at 24 inches on center horizontally above through-wall flashing.

B. Install cavity mortar control panels continuously throughout full height of exterior masonry cavities during construction of exterior wythe, complying with manufacturer's installation instructions. Verify that airspace width is no more than 3/8 inch greater than panel thickness. Install horizontally between joint reinforcement. Stagger end joints in adjacent rows. Fit to perimeter construction and penetrations without voids.

C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

**3.06 CAVITY WALL**

A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.

B. Build inner wythe ahead of outer wythe to receive cavity insulation and air/vapor barrier adhesive.

**3.07 REINFORCEMENT AND ANCHORAGE - GENERAL**

A. Unless otherwise indicated on drawings or specified under specific wall type, install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

E. Fasten anchors to structural framing and embed in masonry joints as masonry is laid. Unless otherwise indicated on drawings or closer spacing is indicated under specific wall type, space anchors at maximum of 36 inches horizontally and 24 inches vertically.

**3.08 REINFORCEMENT AND ANCHORAGE - SINGLE WYTHE MASONRY**

A. Install horizontal joint reinforcement 8 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

### 3.09 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER

A. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 1.77 sq ft of wall surface per anchor. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

### 3.10 REINFORCEMENT AND ANCHORAGES - CAVITY WALL MASONRY

A. Install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of openings.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

### 3.11 REINFORCEMENT AND ANCHORAGES - MULTIPLE WYTHE UNIT MASONRY

A. Install horizontal joint reinforcement 16 inches on center.

B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of opening.

C. Place continuous joint reinforcement in first and second joint below top of walls.

D. Lap joint reinforcement ends minimum 6 inches.

### 3.12 MASONRY FLASHINGS

A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
   1. Extend flashings full width at such interruptions and at least 4 inches into adjacent masonry or turn up at least 4 inches to form watertight pan at non-masonry construction.
   2. Remove or cover protrusions or sharp edges that could puncture flashings.
   3. Seal lapped ends and penetrations of flashing before covering with mortar.

B. Extend plastic flashings to within 1/4 inch of exterior face of masonry.

C. Lap end joints of flashings at least 4 inches and seal watertight with mastic or elastic sealant.

### 3.13 LINTELS

A. Install loose steel lintels over openings.

B. Install reinforced unit masonry lintels over openings where steel or precast concrete lintels are not scheduled.
   1. Openings to 42 inches: Place two, No. 3 reinforcing bars 1 inch from bottom web.
   2. Openings from 42 inches to 78 inches: Place two, No. 5 reinforcing bars 1 inch from bottom web.
   3. Openings over 78 inches: Reinforce openings as detailed.
   4. Do not splice reinforcing bars.
   5. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.
   6. Place and consolidate grout fill without displacing reinforcing.
   7. Allow masonry lintels to attain specified strength before removing temporary supports.

### 3.14 GROUTED COMPONENTS

A. Lap splices minimum 24 bar diameters.

B. Support and secure reinforcing bars from displacement. Maintain position within 1/2 inch of dimensioned position.

C. Place and consolidate grout fill without displacing reinforcing.

**3.15 CONTROL AND EXPANSION JOINTS**

A. Do not continue horizontal joint reinforcement through control and expansion joints.

B. Form control joint with a sheet building paper bond breaker fitted to one side of the hollow contour end of the block unit. Fill the resultant core with grout fill. Rake joint at exposed unit faces for placement of backer rod and sealant.

C. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.

D. Form expansion joint as detailed.

**3.16 BUILT-IN WORK**

A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.

B. Install built-in items plumb, level, and true to line.

C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
   1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

**3.17 TOLERANCES**

A. Maximum Variation from Alignment of Columns: 1/4 inch.

B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.

C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.

D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.

E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.

F. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.

G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

**3.18 CLEANING**

A. Remove excess mortar and mortar droppings.

B. Replace defective mortar. Match adjacent work.

C. Clean soiled surfaces with cleaning solution.

D. Use non-metallic tools in cleaning operations.

**3.19 PROTECTION OF FINISHED WORK**

A. Without damaging completed work, provide protective boards at exposed external corners which are subject to damage by construction activities.

**END OF SECTION**

# SECTION 05400

# COLD-FORMED METAL FRAMING

## PART 1 GENERAL

### 1.01 SUMMARY

A. Section includes:
   1. Cold-formed framing, usually of 14 to 20 gage, including bracing, fasteners and accessories.

B. Products Installed But Not Furnished Under This Section:
   1. Hot rolled steel shapes; refer to Section 05120.
   2. Insulation inaccessible after framing fabrication; refer to Section 07211.

### 1.02 SYSTEM REQUIREMENTS

A. Performance Requirements:
   1. Fabricate and assemble system to provide for movement of components without damage, failure of joint seals, undue stress on fasteners, or other detrimental effects when subject to seasonal or cyclic day/night temperature ranges.
   2. Fabricate and assemble system to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

B. Interface With Adjacent Systems:
   1. Integrate design and connections with adjacent construction.
   2. Accommodate allowable tolerances and deflections of structural members in installation.

### 1.03 SUBMITTALS

A. General: Submit in accordance with Section 01300.

B. Product Data:
   1. Submit product data for framing members, accessories, and connection devices.
   2. Describe materials, finish and section properties.

C. Shop Drawings:
   1. Sections and details indicating component locations, connections between components, connections of components to structure.
   2. Connection details indicating size, locations, and spacings of fasteners and welds.
   3. Accessory installation details.

D. Submit following Informational Submittals:
   1. Qualification Data: Manufacturer's, erector's, and welder's qualification data.
   2. Certifications specified in Quality Assurance article.

### 1.04 QUALITY ASSURANCE

A. Erector Qualifications: Minimum of 5 years documented experience on comparable steel stud framing projects.

B. Welder Qualifications: AWS certified within past 12 months for each type of weld required.

C. Certifications:
   1. Submit certificates verifying AWS qualifications for each welder employed on Project.

2. Submit fabricator's certification that products furnished for Project meet or exceed specified requirements.

## 1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with requirements of Section 01600.

## 1.06 PROJECT CONDITIONS

A. Field verify measurements. Architect will not review or take responsibility for dimensions.

# PART 2 PRODUCTS

## 2.01 ACCEPTABLE MANUFACTURERS

A. Manufacturers:
1. American Studco, Inc, Phoenix, AZ
2. Angeles Metal Systems, Los Angeles, CA
3. Clark Framing Systems, Inc., Cincinnati, OH
4. Consolidated Systems, Inc., Memphis, TN
5. Dale/Incor Industries of Florida.
6. Dale Industries, Inc., Detroit, MI
7. Delta Metal Products, Dallas, TX
8. Dietrich Industries, Inc., Dallas, TX
9. Knorr Steel Framing Systems. Salem, OR.
10. Unimast, Inc., Houston, TX
11. United Construction Supply.
12. Western Metal Lath Co.

## 2.02 MATERIALS

A. Studs and Joists:
1. C-shape design, roll formed with punched web, 34.9 mm (1-3/8 inch) minimum face flange and manufacturer's standard return lip.
2. Galvanized studs:
   a. 18 gage and thinner: ASTM A446, Grade A.
   b. 16 gage and thicker: ASTM A446, Grade A.

B. Runners:
1. Channel shaped; same width as studs, tight fit; solid web.
2. Galvanized: ASTM A446/A446M, Grade A.

C. Accessories, Plates, Gussets, Clips: Formed sheet steel, thickness determined for conditions encountered thickness as indicated on Drawings; same finish as framing members.

D. Structural Steel Shapes: Comply with Section 05120. Size as indicated on Drawings.

E. Fasteners:
1. Self-drilling, self-tapping screws, bolts, nuts and washers: Size, type and spacing determined to suit Project conditions; ASTM A153, hot-dip galvanized, Class C or D as appropriate
2. Anchorage Devices: Power driven or powder actuated as appropriate for material connected.
3. Welding: In conformance with AWS D1.3.

F. Galvanizing Touch-Up Paint: FS TT-P-641, zinc oxide type.

**2.03 FABRICATION**

A. Fit and assemble in largest practical sections for delivery to site, ready for installation.

B. Fabricate in accordance with requirements of ASTM C955.

C. Cut framing components squarely for attachment to perpendicular members, or as required for angular fit against abutting members. Hold members positively in place until properly fastened.

D. Fabricate studs of sizes and sheet metal thicknesses as required by design indicated on Drawings.

**2.04 FINISHES**

A. Framing Components: Galvanized, ASTM A525 G90 coating.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that surfaces acting as framing substrates are free from debris.

B. Do not proceed with installation until defects are corrected.

C. Beginning of installation indicates acceptance of existing conditions.

**3.02 ERECTION OF MEMBERS**

A. Install framing components in accordance with manufacturer's instructions.

B. Make provisions for erection stresses. Provide temporary alignment and bracing.

C. Place joists at spacing as indicated on drawings, not more than 2 inches from abutting walls.

D. Connect joists to supports using fastener method.

E. Set ceiling joists parallel and level, with lateral bracing and bridging.

F. Provide joist web stiffeners at reaction points.

G. Touch-up field welds and damaged galvanized surfaces with primer.

**3.03 TOLERANCES**

A. Maximum variation from true position: 1/4 inch.

B. Maximum variation of any member from plane: 1/8 inch in 4'-0", non-cumulative.

**END OF SECTION**

**SECTION 05500**

# METAL FABRICATIONS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Shop fabricated steel items.

### 1.02 RELATED SECTIONS

A. Section 03300 - Cast-in-Place Concrete: Placement of metal fabrications in concrete.

B. Section 04810 - Unit Masonry Assemblies: Placement of metal fabrications in masonry.

C. Section 05510 - Metal Stairs.

D. Section 05520 - Handrails and Railings.

E. Section 09900 - Paints and Coatings: Paint finish.

### 1.03 REFERENCES

A. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2002.

B. ASTM A 36/A 36M - Standard Specification for Carbon Structural Steel; 2003a.

C. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2002.

D. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2002.

E. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2003.

F. ASTM A 283/A 283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2003.

G. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength; 2004.

H. ASTM A 325M - Standard Specification for Structural Bolts, Steel, Heat Treated 830 MPa Tensile Strength (Metric); 2004.

I. ASTM A 500 - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes; 2003a.

J. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; American Welding Society; 1998.

K. AWS D1.1 - Structural Welding Code - Steel; American Welding Society; 2004.

L. SSPC-Paint 15 - Steel Joist Shop Primer; Society for Protective Coatings; 1999 (Ed. 2000).

M. SSPC-Paint 20 - Zinc-Rich Primers (Type I, "Inorganic," and Type II, "Organic"); Society for Protective Coatings; 2002.

N. SSPC-SP 2 - Hand Tool Cleaning; Society for Protective Coatings; 1982 (Ed. 2000).

### 1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
   1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

C. Welders' Certificates: Submit certification for welders employed on the project, verifying AWS qualification within the previous 12 months.

## PART 2 PRODUCTS

### 2.01 MATERIALS - STEEL

A. Steel Sections: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A 500, Grade B cold-formed structural tubing.

C. Plates: ASTM A 283.

D. Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.

E. Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, galvanized to ASTM A 153/A 153M where connecting galvanized components or masonry components.

F. Welding Materials: AWS D1.1; type required for materials being welded.

G. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

H. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

### 2.02 FABRICATION

A. Fit and shop assemble items in largest practical sections, for delivery to site.

B. Fabricate items with joints tightly fitted and secured.

C. Continuously seal joined members by intermittent welds and plastic filler.

D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

### 2.03 FABRICATED ITEMS

A. Vertical Ladders: Steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.
   1. Side Rails: 3/8 x 2 inches members spaced at 20 inches.
   2. Rungs: one inch diameter solid round bar spaced 12 inches on center.
   3. Space rungs 7 inches from wall surface.

B. Ledge Angles, Shelf Angles, Channels, and Plates Not Attached to Structural Framing: For support of metal decking; prime paint finish.

C. Lintels: As detailed; prime paint finish.

**2.04 FINISHES - STEEL**

A. Prime paint all steel items.
   1. Exceptions: Galvanize items to be embedded in concrete or masonry.
   2. Exceptions: Do not prime surfaces in direct contact with concrete, where field welding is required, and items to be covered with sprayed fireproofing.

B. Prepare surfaces to be primed in accordance with SSPC-SP2.

C. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

D. Prime Painting: One coat.

E. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A 123/A 123M requirements.

F. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A 123/A 123M requirements.

**2.05 FABRICATION TOLERANCES**

A. Squareness: 1/8 inch maximum difference in diagonal measurements.

B. Maximum Offset Between Faces: 1/16 inch.

C. Maximum Misalignment of Adjacent Members: 1/16 inch.

D. Maximum Bow: 1/8 inch in 48 inches.

E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that field conditions are acceptable and are ready to receive work.

**3.02 PREPARATION**

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

**3.03 INSTALLATION**

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

C. Field weld components indicated.

D. Perform field welding in accordance with AWS D1.1.

E. Obtain approval prior to site cutting or making adjustments not scheduled.

F. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

### 3.04 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

**END OF SECTION**

# SECTION 05520

# HANDRAILS AND RAILINGS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Steel pipe handrails, balusters, and fittings.

B. Ornamental handrails.

### 1.02 RELATED SECTIONS

A. Section 03300 - Cast-in-Place Concrete: Placement of anchors in concrete.

B. Section 04810 - Unit Masonry Assemblies: Placement of anchors in masonry.

C. Section 05510 - Metal Stairs: Handrails other than those specified in this section.

D. Section 09900 - Paints and Coatings: Paint finish.

### 1.03 REFERENCES

A. ASTM A 53/A 53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2002.

B. ASTM E 985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000.

C. SSPC-Paint 15 - Steel Joist Shop Paint; The Society for Protective Coatings; 1999 (Ed. 2000).

### 1.04 DESIGN REQUIREMENTS

A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E 985 and applicable local code.

### 1.05 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Handrails and Railings:
   1. Poma Corp: www.wbuildingproducts.com./poma/rail/html
   2. Sterling Dula Architectural Products: www.sterlingdula.com.
   3. R & B Wagner, Inc: www.rbwagner.com.
   4. Substitutions: See Section 01600 - Product Requirements.

B. Ornamental Handrails:
   1. Decorative Iron: www.decorativeiron.com.
   2. Substitutions: See Section 01600 - Product Requirements.

### 2.02 STEEL RAILING SYSTEM

A. Pipe: ASTM A 53/A 53M, Grade B Schedule 40, black finish.

B. Fittings: Elbows, T-shapes, wall brackets, escutcheons; cast steel.

C. Mounting: Adjustable Brackets and flanges, with steel inserts for casting in concrete. Prepare backing plate for mounting in masonry wall construction.

D. Exposed Fasteners: Flush countersunk screws or bolts; consistent with design of railing.

E. Splice Connectors: Steel concealed spigots.

F. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.

### 2.03 ORNAMENTAL RAILING SYSTEM

A. Acceptable Products:
   1. Cap Rail: No. MCRW manufactured by Decorative Iron.
   2. Wall Bracket: No. 3A manufactured by Decorative Iron.
   3. Substitutions: See Section 01600 - Product Requirements.

### 2.04 FABRICATION

A. Fit and shop assemble components in largest practical sizes for delivery to site.

B. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.

C. Provide anchors and plates required for connecting railings to structure.

D. Exposed Mechanical Fastenings: Provide flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.

E. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

F. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.

G. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.

H. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

I. Accurately form components to suit specific project conditions and for proper connection to building structure.

J. Accommodate for expansion and contraction of members and building movement without damage to connections or members.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

### 3.02 PREPARATION

A. Clean and strip primed steel items to bare metal where site welding is required.

B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

### 3.03 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install components plumb and level, accurately fitted, free from distortion or defects.

C. Anchor railings securely to structure.

D. Field weld anchors as indicated on drawings. Touch-up welds with primer. Grind welds smooth.

E. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

F. Assemble with spigots and sleeves to accommodate tight joints and secure installation.

**3.04 ERECTION TOLERANCES**

A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.

B. Maximum Offset From True Alignment: 1/4 inch.

C. Maximum Out-of-Position: 1/4 inch.

**END OF SECTION**

# SECTION 06100

# ROUGH CARPENTRY

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Structural floor, wall, and roof framing.

B. Floor, wall, and roof sheathing.

C. Preservative treatment of wood.

D. Fire retardant treatment of wood.

E. Miscellaneous framing and sheathing.

F. Telephone and electrical panel boards.

G. Wood nailers and curbs for roofing and items installed on roof.

H. Concealed wood blocking for support of toilet and bath accessories, wall cabinets, wood trim, and miscellaneous items requiring anchor support.

I. Miscellaneous wood nailers and furring strips.

### 1.02 RELATED SECTIONS

A. Section 05500 - Metal Fabrications: Miscellaneous steel connectors and support angles for wood framing.

### 1.03 REFERENCES

A. AFPA T10 - Wood Frame Construction Manual; American Forest and Paper Association; 2001.

B. ASTM A 153/A 153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2003.

C. ASTM C 1177/C 1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2004.

D. ASTM D 2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing; 1994 (Reapproved 1999).

E. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2004.

F. AWPA C2 - Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association; 2002.

G. AWPA C9 - Plywood -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association; 2003.

H. AWPA C20 - Structural Lumber -- Fire Retardant Treatment by Pressure Processes; American Wood-Preservers' Association; 2002.

I. AWPA C27 - Plywood -- Fire-Retardant Treatment by Pressure Processes; American Wood-Preservers' Association; 2004.

J. AWPA U1 - Use Category System: User Specification for Treated Wood; American Wood-Preservers' Association; 2004.

K. PS 1 - Construction and Industrial Plywood; National Institute of Standards and Technology (Department of Commerce); 1995.

L. PS 20 - American Softwood Lumber Standard; National Institute of Standards and Technology (Department of Commerce); 1999.

M. SPIB (GR) - Grading Rules; Southern Pine Inspection Bureau, Inc.; 2002.

### 1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.

C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

### 1.05 QUALITY ASSURANCE

A. Lumber: Comply with PS 20 and approved grading rules and inspection agencies.

B. Exposed-to-View Rough Carpentry: Submit manufacturer's certificate that products meet or exceed specified requirements, in lieu of grade stamping.

C. Fire-Retardant Treated Wood: Mark each piece of wood with producer's stamp indicating compliance with specified requirements.

D. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWPA standards.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.

B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

## PART 2 PRODUCTS

### 2.01 DIMENSION LUMBER

A. Grading Agency: Southern Pine Inspection Bureau, Inc. (SPIB).

B. Sizes: Nominal sizes as indicated on drawings, S4S.

C. Moisture Content: S-dry or MC19.

D. Joist, Rafter, and Small Beam Framing (2 x 6 through 4 x 16 ):
   1. Machine stress-rated (MSR) as follows:
      a. Fb-single (minimum extreme fiber stress in bending): 1350 psi.
      b. E (minimum modulus of elasticity): 1,300,000 psi.
   2. Species: Southern Pine.

E. Miscellaneous Blocking, Furring, and Nailers:
   1. Lumber: S4S, No. 2 or Standard Grade.
   2. Boards: Standard or No. 3.

### 2.02 CONSTRUCTION PANELS

A. Subfloor/Underlayment Combination: APA rated Sturdi-Floor.
   1. Exposure Class: Exterior.
   2. Span Rating: 16 inches.
   3. Thickness: 1-1/8 inch nominal.

B. APA Rated Roof Sheathing: Exterior Exposure Class, and as follows:
   1. Structural I.

2. Span Rating: 24/0.

C. Plywood Wall Sheathing: PS 1, Grade C-D, Exposure I.

D. Glass Mat Faced Gypsum Sheathing: ASTM C 1177/C 1177M, water-resistant core, square long edges, 1/2 inch thick.
   1. Acceptable Product: Dens Glas Gold; manufactured by Georgia Pacific.

E. Miscellaneous Panels:
   1. Concealed Plywood: PS 1, C-C Plugged, exterior grade.
   2. Exposed Plywood: PS 1, A-D, interior grade.
   3. Electrical Component Mounting: APA rated sheathing, fire retardant treated.

**2.03 ACCESSORIES**

A. Fasteners and Anchors:
   1. Metal and Finish: Hot-dipped galvanized steel per ASTM A 153/A 153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
   2. Drywall Screws: Bugle head, hardened steel, power driven type, length three times thickness of sheathing.
   3. Anchors: Toggle bolt type for anchorage to hollow masonry.

B. Building Paper: No. 30 asphalt felt.

C. Joint tape: 2" wide 10 x 10 glass mesh tape.

**2.04 FACTORY WOOD TREATMENT**

A. Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

B. Fire Retardant Treatment:
   1. Manufacturers:
      a. Arch Wood Protection, Inc.: www.wolmanizedwood.com.
      b. Hoover Treated Wood Products, Inc.: www.frtw.com.
      c. Osmose, Inc.: www.osmose.com.
   2. Exterior Type: AWPA Use Category UCFB, Commodity Specification H (Treatment C20 for lumber and C27 for plywood), chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E 84, with no evidence of significant combustion when test is extended for an additional 20 minutes both before and after accelerated weathering test performed in accordance with ASTM D 2898.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. Do not use treated wood in direct contact with the ground.
   3. Interior Type A: AWPA Use Category UCFA, Commodity Specification H (Treatment C20 for lumber and C27 for plywood), low temperature (low hygroscopic) type, chemically treated and pressure impregnated; capable of providing a maximum flame spread rating of 25 when tested in accordance with ASTM E 84, with no evidence of significant combustion when test is extended for an additional 20 minutes.
      a. Kiln dry wood after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood.
      b. Treat rough carpentry items as indicated .
      c. Do not use treated wood in applications exposed to weather or where the wood may become wet.

C. Preservative Treatment:
   1. Manufacturers:
      a. Arch Wood Protection, Inc.: www.wolmanizedwood.com.
      b. Chemical Specialties, Inc.: www.treatedwood.com.
      c. Osmose, Inc.: www.osmose.com.
      d. Substitutions: See Section 01600 - Product Requirements.

D. Preservative Pressure Treatment of Lumber Above Grade: AWPA Use Category UC3B, Commodity Specification A (Treatment C2) using waterborne preservative to 0.25 lb/cu ft retention.
   1. Kiln dry lumber after treatment to maximum moisture content of 19 percent.
   2. Treat lumber in contact with roofing, flashing, or waterproofing.
   3. Treat lumber in contact with masonry or concrete.
   4. Treat lumber less than 18 inches above grade.
   5. Preservative Pressure Treatment of Plywood Above Grade: AWPA Use Category UC2 and UC3B, Commodity Specification F (Treatment C9) using waterborne preservative to 0.25 lb/cu ft retention.
      a. Kiln dry plywood after treatment to maximum moisture content of 19 percent.
      b. Treat plywood in contact with roofing, flashing, or waterproofing.
      c. Treat plywood in contact with masonry or concrete.
      d. Treat plywood in other locations as indicated.

E. Preservative Pressure Treatment of Lumber in Contact with Soil: AWPA Use Category UC4A, Commodity Specification A (Treatment C2) using waterborne preservative to 0.4 lb/cu ft retention.
   1. Preservative for Field Application to Cut Surfaces: As recommended by manufacturer of factory treatment chemicals for brush-application in the field.
   2. Restrictions: Do not use lumber or plywood treated with chromated copper arsenate (CCA) in exposed exterior applications subject to leaching.

## PART 3 EXECUTION

### 3.01 FRAMING INSTALLATION

A. Set structural members level, plumb, and true to line. Discard pieces with defects that would lower required strength or result in unacceptable appearance of exposed members.

B. Make provisions for temporary construction loads, and provide temporary bracing sufficient to maintain structure in true alignment and safe condition until completion of erection and installation of permanent bracing.

C. Install structural members full length without splices unless otherwise specifically detailed.

D. Comply with member sizes, spacing, and configurations indicated, and fastener size and spacing indicated, but not less than required by applicable codes and AFPA Wood Frame Construction Manual.

E. Install horizontal spanning members with crown edge up and not less than 1-1/2 inches of bearing at each end.

F. Provide bridging at joists in excess of 8 feet span as detailed. Fit solid blocking at ends of members.

G. Frame openings with two or more studs at each jamb; support headers on cripple studs.

H. Provide miscellaneous members as indicated or as required to support finishes, fixtures, specialty items, and trim.

### 3.02 INSTALLATION OF ACCESSORIES AND MISCELLANEOUS WOOD

A. Coordinate installation of wood decking.

B. Curb roof openings except where prefabricated curbs are provided. Form corners by alternating lapping side members.

C. Coordinate curb installation with installation of decking and support of deck openings.

### 3.03 INSTALLATION OF CONSTRUCTION PANELS

A. Subflooring/Underlayment Combination: Glue and nail to framing; staples are not permitted.

B. Roof Sheathing: Secure panels perpendicular to framing members, with ends staggered and sheet ends over firm bearing.
   1. Use sheathing clips between roof framing members.
   2. Provide solid edge blocking between sheets.
   3. Nail panels to framing; staples are not permitted.

C. Wall Sheathing: Secure with long dimension perpendicular to wall studs, with ends over firm bearing and staggered, using nails, screws, or staples as recommended by the sheathing manufacturer. Apply with manufacturer recommended face toward the exterior.
   1. Apply joint tape prior to installation of building paper.
   2. Apply building paper over face of sheathing.

### 3.04 SITE APPLIED WOOD TREATMENT

A. Apply preservative treatment compatible with factory applied treatment at site-sawn cuts, complying with manufacturer's instructions.

B. Allow preservative to dry prior to erecting members.

### 3.05 TOLERANCES

A. Framing Members: 1/4 inch from true position, maximum.

B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

**END OF SECTION**

# SECTION 06200

# FINISH CARPENTRY

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Finish carpentry items.

B. Wood door frames, glazed frames.

C. Wood casings and moldings.

D. Hardware and attachment accessories.

### 1.02 RELATED SECTIONS

A. Section 08211 - Flush Wood Doors.

B. Section 08212 - Stile and Rail Wood Doors.

C. Section 08800 - Glazing

D. Section 09900 - Paints and Coatings: Painting and finishing of finish carpentry items.

### 1.03 REFERENCES

A. AHA A135.4 - Basic Hardboard; American Hardboard Association; 1995.

B. ANSI A208.1 - American National Standard for Particleboard; 1999.

C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2004.

D. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2003.

E. AWPA C2 - Lumber, Timber, Bridge Ties and Mine Ties -- Preservative Treatment by Pressure Processes; American Wood-Preservers' Association; 2002.

F. NEMA LD 3 - High-Pressure Decorative Laminates; National Electrical Manufacturers Association; 2000.

### 1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements for submittal procedures.

B. Product Data:
   1. Provide data on fire retardant treatment materials and application instructions.

C. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, accessories, to a minimum scale of 1-1/2 inch to 1 ft.

D. Samples: Submit two samples of finish plywood, 12x12 inch in size illustrating wood grain and specified finish.

E. Samples: Submit two samples of wood trim 18 inch long.

### 1.05 QUALITY ASSURANCE

A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Premium grade.

B. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum three years of documented experience.

### 1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire retardant requirements.

### 1.07 DELIVERY, STORAGE, AND PROTECTION

A. Protect work from moisture damage.

### 1.08 PROJECT CONDITIONS

A. Sequence installation to ensure utility connections are achieved in an orderly and expeditious manner.

B. Coordinate the work with plumbing rough-in, electrical rough-in, and installation of associated and adjacent components.

## PART 2 PRODUCTS

### 2.01 LUMBER MATERIALS

A. Hardwood Lumber
   1. Lumber for transparent finish: Natural Birch species, rotary sawn, maximum moisture content of 6 percent; with vertical grain, of quality suitable for transparent finish.
   2. Lumber for painted finish: Poplar species, maximum moisture content of 6 percent; of quality suitable for paint finish.

### 2.02 SHEET MATERIALS

A. Medium Density Fiberboard (MDF): ANSI A208.2; composed of wood fibers pressure bonded with moisture resistant adhesive to suit application; sanded faces, thickness as indicated on drawings.

### 2.03 PLASTIC LAMINATE MATERIALS

A. Plastic Laminate: NEMA LD 3, HGS; Architect selected color, texture and finish.

B. Laminate Backing Sheet: NEMA LD 3, BKL; undecorated plastic laminate.

### 2.04 ADHESIVE

A. Adhesive: Type recommended by laminate manufacturer to suit application.

### 2.05 FASTENERS

A. Fasteners: Of size and type to suit application.

### 2.06 ACCESSORIES

A. Lumber for Shimming, Blocking, and Grounding: Softwood lumber of pine species.

B. Glass: Type specified in Section 08800.

C. Primer: Alkyd primer sealer type.

D. Wood Filler: Solvent base, tinted to match surface finish color.

### 2.07 FABRICATION

A. Shop assemble work for delivery to site, permitting passage through building openings.

B. Fit exposed sheet material edges with 3/8 inch matching hardwood edging. Use one piece for full length only.

C. Cap exposed plastic laminate finish edges with material of same finish and pattern.

D. Shop prepare and identify components for book match grain matching during site erection.

E. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

F. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners.

G. Apply laminate backing sheet to reverse face of plastic laminate finished surfaces.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify mechanical, electrical, and building items affecting work of this section are placed and ready to receive this work.

### 3.02 INSTALLATION

A. Set and secure materials and components in place, plumb and level.

B. Carefully scribe work abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim to conceal larger gaps.

### 3.03 PREPARATION FOR SITE FINISHING

A. Set exposed fasteners. Apply wood filler in exposed fastener indentations. Sand work smooth.

B. Site Finishing: See Section 09900.

C. Before installation, prime paint surfaces of items or assemblies to be in contact with cementitious materials.

### 3.04 ERECTION TOLERANCES

A. Maximum Variation from True Position: 1/16 inch.

B. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch.

**END OF SECTION**

# SECTION 06410

# PLASTIC LAMINATE FACED CABINETS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Custom fabricated, plastic laminate faced cabinet units.

B. Countertops.

C. Cabinet hardware.

### 1.02 REFERENCES

A. AHA A135.4 - Basic Hardboard; American Hardboard Association; 1995.

B. ANSI A208.1 - American National Standard for Particleboard; 1999.

C. AWI P-200 - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute; 1997, Seventh Edition, Version 1.0.

### 1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate materials, component profiles and elevations, assembly methods, joint details, fastening methods, accessory listings, hardware location and schedule of finishes.

C. Product Data: Provide data for hardware accessories.

D. Samples: Submit two samples of drawer pulls and hinges, illustrating hardware finish.

### 1.04 QUALITY ASSURANCE

A. Perform work in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom quality.

B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

### 1.05 DELIVERY, STORAGE, AND PROTECTION

A. Protect units from moisture damage.

### 1.06 ENVIRONMENTAL REQUIREMENTS

A. During and after installation of work of this section, maintain the same temperature and humidity conditions in building spaces as will occur after occupancy.

## PART 2 PRODUCTS

### 2.01 WOOD MATERIALS

A. Softwood Lumber: Graded in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom; average moisture content of 6 percent; pine species.

B. Hardwood Lumber: Graded in accordance with AWI Architectural Woodwork Quality Standards Illustrated, Custom; average moisture content of 6 percent; Birch species quarter sawn.

**2.02 PANEL MATERIALS**

A. Hardwood Plywood and Face Veneers: HPVA HP-1 and as required to meet AWI Quality Standards.

B. Hardboard: AHA A135.4; Pressed wood fiber with resin binder, Class 1 - Tempered, 1/4 inch thick, smooth two sides (S2S); use for drawer bottoms and other components indicated on drawings.

**2.03 LAMINATE MATERIALS**

A. Manufacturers:
   1. Formica Corporation: www.formica.com.
   2. Nevamar, International Paper: www.nevamar.com.
   3. Wilsonart International, Inc: www.wilsonart.com.
   4. Substitutions: Permitted under provisions of Section 01600.

B. Plastic Laminate: In accordance with AWI Quality Standards Illustrated, 0.048 inch General Purpose quality, colors as selected by Architect.

C. Laminate Backing Sheet: 0.020 inch Backing Sheet grade, undecorated plastic laminate.

**2.04 ACCESSORIES**

A. Adhesive: Type recommended by laminate manufacturer to suit application.

B. Fasteners: Size and type to suit application.

C. Concealed Joint Fasteners: Threaded steel.

**2.05 HARDWARE**

A. Shelf Standards and Rests: Formed steel channels and rests, cut for fitted rests spaced at 1 inch centers; satin finish.
   1. Acceptable Product: Knape & Vogt; Pilaster 255 and Shelf Rest 256.

B. Shelf Brackets: Formed steel brackets, formed for attachment with lugs; satin finish.

C. Drawer and Door Pulls: Brushed stainless steel, “U” shaped pull, 4 inch centers.

D. Drawer Slides: Galvanized steel construction, ball bearings separating tracks, full extension type.
   1. Drawers 6 inch and less: Provide 50 lb. class slides.
   2. Drawers 6 inch and more: Provide 100 lb. class slides.

E. Hinges: Concealed ‘European style, round, inletted, steel. Nickel plated.

**2.07 FABRICATION**

A. Shop assemble casework for delivery to site in units easily handled and to permit passage through building openings.

B. Fit shelves, doors, and exposed edges with 3/8 inch matching hardwood edging. Use one piece for full length only.

C. Cap exposed plastic laminate finish edges with material of same finish and pattern.

D. Door and Drawer Fronts: 3/4 inch thick; flush overlay style.

E. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.

F. Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Locate counter

butt joints minimum 2 feet from sink cut-outs.

G. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

H. Mechanically fasten back splash to countertops with steel brackets at 16 inches on center.

I. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify adequacy of backing and support framing.

B. Verify location and sizes of utility rough-in associated with work of this section.

### 3.02 INSTALLATION

A. Set and secure casework in place; rigid, plumb, and level.

B. Use cabinet attachments in concealed locations for wall mounted components.

C. Use concealed joint fasteners to align and secure adjoining cabinet units.

D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.

E. Secure cabinet and counter bases to floor using appropriate angles and anchorages.

F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

### 3.03 ADJUSTING

A. Adjust installed work.

B. Adjust moving or operating parts to function smoothly and correctly.

### 3.04 CLEANING

A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

**END OF SECTION**

# SECTION 07115

# BITUMINOUS DAMPPROOFING

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Bituminous dampproofing.

### 1.02 REFERENCES

A. ASTM D 41 - Standard Specification for Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing; 1994 (reapproved 2000).

B. ASTM D 449 - Standard Specification for Asphalt Used in Dampproofing and Waterproofing; 2003.

C. ASTM D 2822 - Standard Specification for Asphalt Roof Cement; 1991 (Reapproved 1997).

D. ASTM D 3747 - Standard Specification for Emulsified Asphalt Adhesive for Adhering Roof Insulation; 1979 (Reapproved 2000).

E. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2000.

F. NRCA ML104 - The NRCA Roofing and Waterproofing; National Roofing Contractors Association; Fifth Edition.

### 1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide properties of primer, bitumen, and mastics.

C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

### 1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years experience.

### 1.05 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperatures above 40 degrees F for 24 hours before and during application until dampproofing has cured.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Acceptable Manufacturers:
   1. Karnak Chemical Corp: www.karnakcorp.com.
   2. Mar-Flex Systems, Inc: www.mar-flex.com.
   3. W.R. Meadows, Inc: www.wrmeadows.com.
   4. Substitutions: See Section 01600 - Product Requirements.

### 2.02 HOT ASPHALTIC MATERIALS

A. Bitumen: ASTM D 449, Type I, asphalt.

B. Primer: ASTM D 41, compatible with substrate.

C. Sealing Mastic: Asphalt roof cement, ASTM D 4586, Type I.

### 2.03 COLD ASPHALTIC MATERIALS

A. Bitumen: Asphalt emulsion, ASTM D 3747.

B. Asphalt Primer: ASTM D 41, compatible with substrate.

C. Sealing Mastic: Asphalt roof cement, ASTM D 2822, Type I.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.

C. Verify items which penetrate surfaces to receive dampproofing are securely installed.

### 3.02 PREPARATION

A. Protect adjacent surfaces not designated to receive dampproofing.

B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.

C. Do not apply dampproofing to surfaces unacceptable to manufacturer.

D. Apply mastic to seal penetrations, small cracks, or minor honeycomb in substrate.

E. Apply attached flashings prior to application of dampproofing. Apply dampproofing over flashings.

### 3.03 APPLICATION

A. Prime surfaces in accordance with manufacturer's instructions.

B. Apply bitumen at a temperature limited by equiviscous temperature (EVT) plus or minus 25 degrees F; do not exceed finish blowing temperature for four hours.

C. Apply bitumen in one coat, continuous and uniform.

D. Seal items projecting through dampproofing surface with mastic. Seal watertight.

**END OF SECTION**

# SECTION 07212

# BATT INSULATION

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Thermal batt insulation in exterior wall and ceiling construction.

### 1.02 RELATED SECTIONS

A. Section 05400 – Cold Formed Metal Framing: Support for insulation.

### 1.03 REFERENCES

A. ASTM C 578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2001.

B. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2001.

C. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2001.

### 1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

C. Manufacturer's Installation Instructions: Include information on special environmental conditions required for installation and installation techniques.

D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

### 1.05 ENVIRONMENTAL REQUIREMENTS

A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

## PART 2 PRODUCTS

### 2.01 BATT INSULATION MATERIALS

A. Type 1 Batt Insulation for general use in thermal applications: ASTM C 665; preformed glass fiber batt; friction fit, conforming to the following:
   1. Provide insulation made without formaldehyde.
   2. Thermal Resistance: As indicated on drawings.
   3. Thickness: As indicated on drawings.
   4. Facing: Faced on one side with aluminum foil.
   5. Surface Burning Characteristics: Flame spread index of 25 or less; smoke developed index of 50 or less, when tested in accordance with ASTM E 84.
   6. Manufacturers:
      a. CertainTeed Corporation: www.certainteed.com.
      b. Johns Manville Corporation: www.jm.com.
      c. Owens Corning Corp: www.owenscorning.com.
   7. Substitutions: See Section 01600 - Product Requirements.

A. Type 2 Batt Insulation for use in acoustic applications: ASTM C 665; preformed glass fiber batt; friction fit, conforming to the following:
   1. Provide insulation made without formaldehyde.
   2. Thickness: As indicated on drawings.
   3. Facing: Black vinyl face.
   4. Surface Burning Characteristics: Flame spread index of 25 or less; smoke developed index of 50 or less, when tested in accordance with ASTM E 84.
   5. Manufacturers:
      a. CertainTeed Corporation: www.certainteed.com.
      b. Johns Manville Corporation: www.jm.com.
      c. Owens Corning Corp: www.owenscorning.com.
   6. Substitutions: See Section 01600 - Product Requirements.

### 2.02 ACCESSORIES

A. Tape: Polyethylene self-adhering type, mesh reinforced, 2 inch wide.

B. Adhesive: Type recommended by insulation manufacturer for application.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.

### 3.02 BATT INSTALLATION

A. Install insulation in accordance with manufacturer's instructions.

B. Install Type 1 in exterior wall and ceiling spaces without gaps or voids. Do not compress insulation.

C. Install Type 2 in locations shown on drawings without gaps or voids. Do not compress insulation.

D. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.

E. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

### 3.03 PROTECTION OF FINISHED WORK

A. Do not permit installed insulation to be damaged prior to its concealment.

**END OF SECTION**

# SECTION 07216

# THERMOPLASTIC POLYOLEFIN (TPO) MEMBRANE ROOFING

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES

A. TPO Mechanically fastened membrane roofing system.

B. Cover board

C. Roof insulation.

D. Vapor retarder.

E. Substrate board.

### 1.2 RELATED SECTIONS

A. Division 05 Section "Steel Decking" for furnishing acoustical deck rib insulation.

B. Division 06 Section "Miscellaneous Rough Carpentry" for wood nailers, cants, curbs, and blocking[ and for wood-based, structural-use roof deck panels].

C. Division 07 Section "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counterflashings.

D. Division 07 Section "Manufactured Roof Expansion Joints."

E. Division 22 Section "Storm Drainage Piping Specialties" for roof drains.

### 1.3 REFERENCES

A. Roofing Terminology: Refer to the following publications for definitions of roofing work related terms in this Section:

1. ASTM D 1079 “Terminology Relating to Roofing and Waterproofing.”
2. Glossary of NRCA's "The NRCA Roofing and Waterproofing Manual."
3. Roof Consultants Institute “Glossary of Roofing Terms.”

B. Sheet Metal Terminology and Techniques: SMACNA Architectural Sheet Metal Manual.

### 1.4 DESIGN CRITERIA

A. General: Installed roofing membrane system shall remain watertight; and resist specified wind uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Roofing materials shall be compatible with one another under conditions of service and application required, as demonstrated by roofing system manufacturer based on testing and field experience.

C. Wind Uplift Performance: Roofing system shall be identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist wind uplift pressure calculated in accordance with ASCE 7.

D. FMG Listing: Roofing membrane, base flashings, and component materials shall comply with requirements in FMG 4450 and FMG 4470 as part of a roofing system and that are listed in FMG's “RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FMG markings.

1. Fire/Windstorm Classification: Class 1A-75
2. Hail Resistance: MH

### 1.5 SUBMITTALS

A. Product Data: Manufacturer’s data sheets for each product to be provided.

B. Detail Drawings: Provide roofing system plans, elevations, sections, details, and details of attachment to other Work, including:

1. Base flashings, cants, and membrane terminations.
2. Tapered insulation, including slopes.
3. Crickets, saddles, and tapered edge strips, including slopes.
4. Insulation fastening patterns.

C. Verification Samples: Provide for each product specified.

D. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in “Performance Requirements" and “Guarantees” Article.

1. Provide evidence of meeting performance requirements and intent to guarantee.

F. Qualification Data: For Installer and manufacturer.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of roofing system.

## 1.6 QUALITY ASSURANCE

A. Installer Qualifications: Qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive the specified manufacturer's guarantee.

B. Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.

C. Test Reports:

1. Roof drain and leader test or submit plumber’s verification.
2. Core cut (if requested).
3. Roof deck fastener pullout test.

D. Moisture Survey:

1. Submit prior to installation, results of a non-destructive moisture test of roof system completed by approved third party. Utilize one of the approved methods:

a. Infrared Thermography
b. Nuclear Backscatter

E. Source Limitations: Obtain all components from the single source roofing manufacturer guaranteeing the roofing system. All products used in the system must be labeled by the single source roofing manufacturer issuing the guarantee.

F. Fire-Test-Response Characteristics: Provide roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL[, FMG,] or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: Class A ; ASTM E 108, for application and roof slopes indicated.
2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.

## 1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storage.

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.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. 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.

### 1.8 PROJECT CONDITIONS

A. Weather Limitations: Proceed with installation only when current and forecasted weather conditions permit roofing system to be installed in accordance with manufacturer's written instructions and guarantee requirements.

### 1.9 GUARANTEE

A. Provide manufacturer's system guarantee equal to Johns Manville's Peak Advantage No Dollar Limit Roofing System Guarantee.

1. Single-Source special guarantee includes roofing plies, base flashings, liquid applied flashing, roofing membrane accessories and other single-source components of roofing system marketed by the manufacturer.
2. Guarantee Period: 15 years from date of Substantial Completion.
3. Accidental Puncture Rider: Guarantee shall provide coverage for accidental puncture for up to 16 mainhours per year for the life of the guarantee.

B. Installer’s Guarantee: Submit roofing Installer's guarantee, including all components of roofing system for the following guarantee period:

1. Guarantee Period: Five Years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 THERMOPLASTIC POLYOLEFIN ROOFING (TPO) MEMBRANE

A. Fabric-Reinforced Thermoplastic Polyolefin (TPO) Sheet: ASTM D 6878, uniform, flexible sheet formed from a thermoplastic polyolefin, internally fabric or scrim reinforced. Basis of Design: JM TPO [or architect pre approved equal]

1. Thickness: 60 mils (1.14 mm), nominal.
2. Accelerated Weathering: Minimum of 24,000 hours without cracking or crazing as tested using ASTM G155.
3. Tensile Strength: Minimum of 300 lbf as tested using ASTM D751
4. Tearing Strength: Minimum of 85 lbs as tested using ASTM D751

### 2.2 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.

1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's sheet flashing of same material, type, reinforcement, thickness, and color as sheet membrane.

C. Sheet Flashing: Manufacturer's unreinforced sheet flashing of same material as sheet membrane..

D. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, with anchors.

E. Metal Battens: Manufacturer's standard aluminum-zinc-alloy-coated or zinc-coated steel sheet, prepunched.

F. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

G. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, termination reglets, cover strips, and other accessories.

**2.3 AUXILIARY ROOFING SYSTEM COMPONENTS**

A. Expansion Joints: Provide factory fabricated weatherproof, exterior covers for expansion joint openings consisting of flexible rubber membrane, supported by a closed cell foam to form flexible bellows, with two metal flanges, adhesively and mechanically combined to the bellows by a bifurcation process. Provide product manufactured and marketed by single-source membrane supplier that is included in the No Dollar Limit guarantee.

B. Coping System: Manufacturer's factory fabricated coping consisting of a base piece and a snap-on cap. Provide product manufactured and marketed by single-source membrane supplier that is included in the No Dollar Limit guarantee.

**2.4 WALKWAYS**

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads sourced from membrane roofing system manufacturer.

**2.5 COVER BOARD**

A. High-Density Polyisocyanurate: High-density polyisocyanurate technology bonded in-line to mineral-surfaced, fiber glass reinforced facers with greater than 125 lbs of compressive strength (1/4" Johns Manville Invinsa)

**2.6 ROOF INSULATION**

A. General: Preformed roof insulation boards that comply with requirements and referenced standards, selected from manufacturer's standard sizes and of thicknesses indicated.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Choose performance standard or prescriptive thickness.

1. Provide insulation package with R Value of 25 or greater – (2) layers.

**2.7 TAPERED INSULATION**

A. Tapered Insulation: ASTM C 1289, provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48).

**2.8 INSULATION ACCESSORIES**

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.

B. Provide factory preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

C. Fasteners: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening roof insulation to substrate, and furnished by roofing system manufacturer.

D. Urethane Adhesive: Manufacturer's two component urethane adhesive formulated to adhere insulation to substrate.

E. Wood Nailer Strips: Comply with requirements in Division 06 Section **"**Miscellaneous Rough Carpentry**."**

**F. EXECUTION**

## 2.9 EXAMINATION

A. Examine substrates, areas, and conditions for compliance with requirements affecting performance of roofing system:

1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.

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

## 2.10 PREPARATION

A. Clean and remover from substrate sharp projections, dust, debris, moisture, and other substances detrimental to roofing installation in accordance with roofing system manufacturer's written instructions.

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

## 2.11 INSULATION INSTALLATION

A. Coordinate installation of roof system components so insulation and cover board is not exposed to precipitation or left exposed at the end of the workday.

B. Comply with roofing system manufacturer's written instructions for installation of roof insulation and cover board.

C. Install tapered insulation under area of roofing to conform to slopes indicated.

D. Install insulation boards with long joints in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with like material.

E. Trim surface of insulation boards where necessary at roof drains so completed surface is flush and does not restrict flow of water.

F. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.

G. Preliminarily Fastened Insulation for Mechanically Fastened Systems: Install insulation with fasteners at rate required by roofing system manufacturer or applicable authority, which ever is more stringent.

## 2.12 ROOFING MEMBRANE INSTALLATION, GENERAL

A. Install roofing membrane in accordance with roofing system manufacturer's written instructions, applicable recommendations of the roofing manufacturer and requirements in this Section.

B. Start installation of roofing membrane in presence of roofing system manufacturer's technical personnel.

C. Where roof slope exceeds 1/2 inch per 12 inches (1:24, contact the membrane manufacturer for installation instructions regarding installation direction and backnailing

D. Cooperate with testing and inspecting agencies engaged or required to perform services for installing roofing system.

E. Coordinate installing roofing system so insulation and other components of the roofing membrane system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is imminent.

1. Provide tie-offs at end of each day's work to cover exposed roofing membrane sheets and insulation.
2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system.

3. Remove and discard temporary seals before beginning work on adjoining roofing.

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

## 2.13 MECHANICALLY FASTENED ROOFING MEMBRANE INSTALLATION

A. Start installation of roofing membrane in presence of roofing system manufacturer's technical representative.

B. Accurately align roofing membranes and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

C. Mechanically fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.

D. Always install membrane laps perpendicular to the steel deck flutes. “Picture Frame” installation method is not permitted.

E. Apply roofing membrane with side laps shingled with slope of roof deck where possible.

F. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane according to manufacturer's written instructions to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roofing membrane.
2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.

    a. Remove and repair any unsatisfactory sections before proceeding with Work.

3. Repair tears, voids, and lapped seams in roofing membrane that do not meet requirements.

G. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.

H. In-Splice Attachment: Secure one edge of roofing membrane using fastening plates or metal battens centered within membrane splice and mechanically fasten roofing membrane to roof deck. Field-splice seam.

I. Through-Membrane Attachment: Secure roofing membrane using fastening plates or metal battens and mechanically fasten roofing membrane to roof deck. Cover battens and fasteners with a continuous cover strip.

J. Install roofing membrane and auxiliary materials to tie in to existing roofing.

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

## 2.14 FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.

B. Flash penetrations and field-formed inside and outside corners with sheet flashing.

C. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.

D. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

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

## 2.15 WALKWAY INSTALLATION

A. Flexible Walkways: Install walkway products in locations indicated. Adhere with compatible adhesive or heat weld walkway products to substrate according to roofing system manufacturer's written instructions.

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

## 2.16 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.

B. Final Roof Inspection: Arrange for roofing system manufacturer's Registered Roof Observer (RRO) to inspect roofing installation on completion and submit report to Architect.

1. Notify Architect or Owner 48 hours in advance of date and time of inspection.

C. Repair or remove and replace components of roofing system where test results or inspections indicate that they do not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

## 2.17 PROTECTION AND CLEANING

A. Protect roofing system from damage and wear during remainder of construction period.

B. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

**END OF SECTION**

# SECTION 07240

# EXTERIOR INSULATION AND FINISH SYSTEMS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Class PM and PB composite wall and soffit cladding of rigid insulation and applied coating. Provide designated system where indicated on drawings.

### 1.02 RELATED SECTIONS

A. Section 05400 - Cold Formed Metal Framing: Sheathing on metal studs.

B. Section 06100 - Rough Carpentry: Sheathing.

C. Section 07620 - Sheet Metal Flashing and Trim: Perimeter flashings.

D. Section 07900 - Joint Sealers: Perimeter and penetration sealants.

### 1.03 REFERENCES

A. ASTM C 150 - Standard Specification for Portland Cement; 2002a.

B. ASTM C 177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus; 1997.

C. ASTM C 578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation; 2003b.

D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2004.

E. EIMA (PM) - Guideline Specification For Exterior Insulation and Finish Systems, Class PM; EIFS Industry Members Association; 1984, Revised 1999.

F. EIMA (PB) - Guideline Specification For Exterior Insulation and Finish Systems, Class PB; EIFS Industry Members Association; 1984, Revised 1997.

### 1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate wall and soffit joint patterns, joint details, and molding profiles.

C. Product Data: Provide data on system materials, product characteristics, performance criteria, and system limitations.

D. Manufacturers list of approved sealants and sealant manufacturers.

E. Selection Samples: Submit manufacturer's standard range of samples illustrating available coating colors and textures.

F. Verification Samples: Submit actual samples of selected coating on specified substrate, minimum 12 inches square, illustrating project colors and textures.

G. Manufacturer's Installation Instructions: Indicate preparation required, installation techniques, and jointing requirements.

### 1.05 QUALITY ASSURANCE

A. EIFS Manufacturer Qualifications: Provide all EIFS products other than insulation from the same manufacturer with qualifications as follows:
   1. Member in good standing of EIMA (EIFS Industry Members Association).
   2. Manufacturer of EIFS products for not less than 5 years.
   3. Manufacturing facilities ISO 9002 certified.

B. Insulation Manufacturer Qualifications: Approved by manufacturer of EIFS and approved and labeled under third party quality program as required by applicable building code.

C. Installer Qualifications: Company specializing in EIFS work and approved by the EIFS manufacturer.

**1.06 MOCK-UP**

A. Specified in Section 01410 - Approval Mock-Ups. Construct mock-up of typical EIFS application on specified substrate, size as indicated on drawings, and including flashings, joints, and edge conditions.

**1.07 DELIVERY, STORAGE, AND HANDLING**

A. Delivery: Deliver materials to project site in manufacturer's original, unopened containers with labels intact. Inspect materials and notify manufacturer of any discrepancies.

B. Storage: Protect adhesives and finish materials from freezing and temperatures in excess of 90 degrees F.
   1. Protect Portland cement based materials from moisture and humidity. Store under cover off the ground in a dry location.
   2. Protect insulation materials from exposure to sunlight.

**1.08 ENVIRONMENTAL REQUIREMENTS**

A. Do not prepare materials or apply EIFS during inclement weather unless areas of installation are protected. Protect installed EIFS areas from inclement weather until dry.

B. Do not install finish or sealants when ambient temperature is below 40 degrees F.

C. Do not leave installed insulation board exposed to sunlight.

**1.09 WARRANTY**

A. See Section 01780 - Closeout Submittals, for additional warranty requirements.

B. Provide manufacturer's standard material warranty, covering a period of not less than 5 years.

C. Provide separate warranty from installer covering labor for repairs or replacement for a period of not less than 5 years.

D. The Warranties submitted under this Section shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and the laws of governing jurisdictions and is in addition to and runs concurrently with other warranties made by the Contractor under requirements of the Contract Documents.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

A. Acceptable Manufacturers:
   1. Dryvit: www.dryvit.com.
   2. TEIFS: www.teifs.com.
   3. Sto Corp; Product: www.stocorp.com.
   4. Substitutions: See Section 01600 - Product Requirements.

**2.02 CLASS PM SYSTEM**

A. Exterior Insulation and Finish System: Cementitious base coating, minimum 1/4 inch thick, reinforcing mesh, and synthetic finish coating, over mechanically-fastened extruded polystyrene board insulation; complying with performance requirements of EIMA Class PM system.

B. Base Coat: Acrylic or polymer-modified, fiber reinforced Portland cement coating.

C. Finish Coat: Water-based, air curing, acrylic or polymer-based finish with integral color and texture.
   1. Texture:.
   2. Color: As selected from manufacturer's range of standard colors.

D. Portland Cement: ASTM C 150, Type I or II.

E. Insulation Board: Extruded polystyrene board with natural skin surfaces; ASTM C 578, Type IV; with the following characteristics:
   1. Board Size: 48 x 96 inch.
   2. Board Size Tolerance: 1/16 inch from square and dimension.
   3. Board Thickness: As indicated on drawings.
   4. Thickness Tolerance: 1/32 inch maximum.
   5. Board Edges: Square.
   6. Thermal Conductivity (k factor) at 25 degrees F: 0.18 as determined by ASTM C 177.
   7. Compressive Resistance: 25 psi.
   8. Board Density: 1.6 lb/cu ft.
   9. Water Absorption, maximum: 0.3 percent, volume.
   10. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/400, when tested in accordance with ASTM E 84.

F. Reinforcing Mesh: Balanced, open weave glass fiber fabric, treated for compatibility and improved bond with coating; weight, strength, and number of layers as required to meet EIMA Class PM specifications.

**2.03 CLASS PB SYSTEM ( DECORATIVE TRIM AND HORZONTALSURAFCES)**

A. Exterior Insulation and Finish System: Synthetic base and finish coatings with fiberglass reinforcing mesh, over adhesive-attached expanded polystyrene board insulation; complying with performance requirements of EIMA Class PB system.
   1. Impact Resistance: Construct system to provide impact resistance when tested per EIMA 101.86:
      a. High: 90-150 in-lb, for areas with general access to public.

B. Base Coat: Fiber-reinforced, acrylic or polymer-based product that is compatible with insulation board and reinforcing mesh.

C. Finish Coat: Water-based, air curing, acrylic or polymer-based finish with integral color and texture.
   1. Texture: Medium.
   2. Color: As selected from manufacturer's range of standard colors.

D. Molded Polystyrene Board Insulation: Expanded polystyrene board; ASTM C 578, Type I; with the following characteristics:
   1. Board Size: 24 by 48 inches.
   2. Board Size Tolerance: +/-1/16 inch from square and dimension.
   3. Board Edges: Square.
   4. Board Density: 1.6 lb/cu ft.
   5. Compressive Resistance: 25 psi.
   6. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/400, when tested in accordance with ASTM E 84.

E. Reinforcing Mesh: Balanced, open weave glass fiber fabric, treated for compatibility and improved bond with coating, weight, strength, and number of layers as required to meet required system impact rating.

### 2.04 ACCESSORIES

A. Insulation Fasteners: Fastener and plate system appropriate for substrate and as recommended by EIFS manufacturer.

B. Flashing: As specified in Section 07650 - Wall Flashing.

C. Flashing Tape: Self-adhering rubberized asphalt tape with polyethylene backing for maintenance of continuous weather barrier at substrate transitions and intersections with other materials.

D. Trim: EIFS manufacturer's standard PVC or galvanized steel trim accessories, as required for a complete project and including starter track.

E. Sealant Materials: As recommended by EIFS manufacturer.

F. Waterproofing: Manufacturer’s standard waterproofing material.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that substrate is sound and free of oil, loose materials, or protrusions that could interfere with EIFS installation and is of a type that is acceptable to EIFS manufacturer. Do not begin work until substrate and adjacent materials are thoroughly dry.

B. Verify that substrate surface is flat, with no deviation greater than 1/4 in when tested with a 10 ft straightedge.

### 3.02 PREPARATION

A. Apply primer to substrate as recommended by EIFS manufacturer for project conditions.

### 3.03 INSTALLATION - GENERAL

A. Install in accordance with manufacturer's instructions and requirements and recommendations of EIMA Guideline Specification For Exterior Insulation and Finish Systems, Class PM.

B. Accessories: Install starter track, back-wrap mesh or edge-wrap mesh at system terminations and other accessories as recommended by EIFS manufacturer, assuring that track is level and securely fastened.

### 3.04 INSTALLATION - INSULATION

A. Install insulation in accordance with manufacturer's instructions.

B. On wall surfaces, install boards horizontally.

C. Place boards in a method to maximize tight joints. Stagger vertical joints and interlock at corners. Butt edges and ends tight to adjacent board and to protrusions. Achieve a continuous flush insulation surface, with no gaps in excess of 1/16 inch.

D. Rasp irregularities off installed insulation board.

E. Mechanical Fastening: Space fasteners as recommended by EIFS manufacturer.

### 3.05 INSTALLATION - CLASS PM SYSTEM

A. Joints: Install control and expansion joints at spacings indicated on the drawings. Do not exceed 150 sq ft for areas defined by the placement of control joints.

B. Trim: Install trim as required. Install only in full lengths, to minimize moisture intrusion; cut horizontal trim tight to vertical trim.

C. Reinforcing Mesh: Install in strict accordance with manufacturer's instructions, using mechanical fasteners at spacing recommended.
   1. Lap reinforcing mesh edges and ends 2 inches minimum.

D. Base Coat: Install to minimum thickness specified, following manufacturer's instructions. Leave base coat in condition suitable to receive finish coat.

E. Finish Coat: Apply finish coat after base coat has dried not less than 24 hours and finish to a uniform texture and color.
   1. Thickness: As recommended by manufacturer.

F. Apply sealant at finish perimeter and at control and expansion joints as detailed and in accordance with Section 07900.

**3.06 INSTALLATION - CLASS PB SYSTEM**

A. Base Coat: Apply in thickness as necessary to fully embed reinforcing mesh, wrinkle free, including back-wrap at all terminations of the EIFS. Install reinforcing fabric as recommended by EIFS manufacturer.
   1. Lap reinforcing mesh edges and ends a minimum of 2-1/2 inches.

B. Install trim as indicated. Install only in full lengths, to minimize moisture intrusion; cut horizontal trim tight to vertical trim.

C. Install expansion joints at floorlines as recommended by EIFS manufacturer.

D. Apply finish coat after base coat has dried not less than 24 hours, embed finish aggregate, and finish to a uniform texture and color.

E. Apply sealant at finish perimeter and expansion joints in accordance with Section 07900.

**3.07 CLEANING AND PROTECTION**

A. Do not permit finish surface to become soiled or damaged.

B. Remove excess and waste EIFS materials from project site.

C. Clean EIFS surfaces and work areas of foreign materials resulting from EIFS operations.

**END OF SECTION**

**SECTION 07270**

FLUID-APPLIED MEMBRANE AIR BARRIERS, VAPOR PERMEABLE

## PART 1 - GENERAL

### 1.1 SUMMARY

A. Section includes fluid-applied, vapor-permeable membrane air barriers.

### 1.2 RELATED REQUIREMENTS

1. Division 01 Section "Sustainable Design Requirements" for additional requirements, including [LEED] documentation requirements.
2. Section 04 20 00 "Unit Masonry" for [air barrier substrates and] compatibility with flashing components.
3. Section 04 21 13 "Brick Masonry" for compatibility with flashing components.
4. Section 06 16 00 "Sheathing" for air barrier substrates[ and joint treatments].
5. Division 07 roofing Sections for roof assembly air barriers and interface coordination.
6. Division 08 exterior openings sections for framing for [aluminum-framed entrances and storefronts] [aluminum windows] [glazed aluminum curtain walls] [louvers and vents] receiving air barrier transition assembly specified in this Section.

### 1.3 REFERENCES

A. References, General: Versions of the [following] [cited] standards current as of the date of issue of the project apply to the Work of this Section.

B. ASTM International (ASTM):

1. ASTM A 240/A 240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
2. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants
3. ASTM C 1193 - Guide for Use of Joint Sealants
4. ASTM D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
5. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials
6. ASTM E 96/E 96M - Standard Test Methods for Water Vapor Transmission of Materials
7. ASTM E 162 - Standard Test Method for Surface Flammability of Materials Using a Radiant Heat Energy Source
8. ASTM E 783 - Standard Test Method for Field Measurement of Air Leakage through Installed Exterior Windows and Doors
9. ASTM E 1186 - Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems

10. ASTM E 2178 - Standard Test Method for Air Permeance of Building Materials
11. ASTM E 2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies

C. National Fire Protection Association (NFPA): www.nfpa.org:

1. NFPA 285 - Standard Fire Test Method For Evaluation Of Fire Propagation Characteristics Of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

**D. U. S. Environmental Protection Agency (EPA): www.epa.gov:**

1. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings

E. US Green Building Council (USGBC): www.usgbc.org:

1. Leadership in Energy and Environmental Design (LEED) Green Building Rating System

1.4 ADMINISTRATIVE REQUIREMENTS

A. Coordination: Coordinate installation of joint sealants with cleaning of joint sealant substrates and other operations that may impact installation or finished joint sealant work.
1. Review manufacturer's instructions for air barrier application meeting Project requirements for substrates specified, including three-dimensional video model demonstrating proper application of components at wall openings.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of air barrier product specified, including:

1. Technical data indicating compliance with requirements.
2. Substrate preparation instructions and recommendations.

B. Shop Drawings: Show locations for air barrier. Show details for each type of substrate, joints, and edge conditions, including flashings, counterflashings, penetrations, transitions, and terminations.

1. Show location of transition and accessory materials providing connectivity through out the assemblies.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturer[, and Air Barrier Inspector].

1. Certification of manufacturer's approval of Installer.

B. Manufacturer's Product Compatibility Certificate: Certify compatibility of air barrier products with adjacent materials.

C. Low-Emitting Product Certificate: For air barrier products specified to meet volatile organic emissions standards, submit Greenguard Children and Schools Certification or comparable certification acceptable to Architect.

D. Fire Propagation Characteristics Certificate: From a qualified testing agency, documentation that air barrier system as a component of a wall assembly has been tested and passed NFPA 285. Include system classification number of testing agency on shop drawings.

E. Product Test Reports: Test data for air barrier products and air barrier assembly, by qualified testing agency, indicating proposed membrane air barrier meets performance requirements, when requested by Architect.

F. Warranty: Sample of unexecuted manufacturer and installer special warranties.

G. Field quality control reports.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: A firm with minimum [three] years experience in installation of specified products in successful use on similar projects, employing workers trained by manufacturer, including a full-time on-site supervisor with a minimum of [three] years experience installing similar work, able to communicate verbally with Contractor[, Architect,] and employees.

B. Air Barrier Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified air barrier system, qualified to perform observation and inspection specified in Field Quality Control Article, to determine Installer’s compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.
2. A independent party certified as an air barrier inspector by the ABAA or other certifying organization acceptable to Architect, retained by the Contractor.

1.8 DELIVERY, STORAGE AND HANDLING

A. Accept materials on site in manufacturer's unopened original packaging.

B. Store products in weather protected environment, clear of ground and moisture, within temperature ranges recommended by air barrier manufacturer.

1.9 ENVIRONMENTAL REQUIREMENTS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended 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.

1.10 SCHEDULING

A. Coordinate installation of membrane air barrier with completion of roofing and other work requiring interface with air barrier.

B. Schedule work so air barrier applications may be inspected prior to concealment.

C. Ensure air barrier materials are cured before covering with other materials.

1.11 WARRANTY

A. Special Manufacturer's Warranty: Manufacturer's standard form in which air barrier manufacturer agrees to furnish and install air barrier material to repair or replace those materials installed according to manufacturer's written instructions that exhibit material defects or otherwise fail to perform as specified under normal use within warranty period specified.

1. Access for Repair: Owner shall provide unimpeded access to the Project and the air barrier system for purposes of testing, leak investigation, and repair, and shall reinstall removed cladding materials upon completion of repair.
2. Cost Limitation: Manufacturer's obligation for repair or replacement shall be limited to the original installed cost of the work.
3. Warranty Period: [] years date of Substantial Completion.

B. Special warranties specified in this article exclude deterioration or failure of air barrier materials from the following:

1. Movement of the structure caused by structural settlement or stresses on the air barrier exceeding manufacturer's written specifications for elongation.
2. Mechanical damage caused by outside agents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Products: Provide air barrier products manufactured by **Tremco, Inc., Commercial Sealants and Waterproofing Division, An RPM Company**, Beachwood OH; (866) 321-6357; email: techresources@tremcoinc.com; www.tremcosealants.com, [or comparable products of other manufacturer approved by Architect in accordance with Instructions to Bidders and Division 01 General Requirements].

2.2 MATERIALS, GENERAL

A. Source Limitations: Obtain air-barrier materials from single source from single manufacturer.

B. VOC Content: 250 g/L maximum per 40 CFR 59, Subpart D (EPA Method 24) and complying with requirements of authorities having jurisdiction.

C. Low-Emitting Products: Provide sealants and sealant primers complying with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Compatibility: Provide membrane air barrier materials that are compatible with one another and with adjacent materials under conditions of service and application required, as demonstrated by membrane air barrier manufacturer based on testing and field experience.

2.3 PERFORMANCE REQUIREMENTS

A. General: Membrane air barrier shall be capable of performing as a continuous vapor- permeable air barrier and as a moisture drainage plane transitioned to adjacent flashings and discharging water to the building exterior. Membrane air barriers shall accommodate substrate movement and seal expansion and control joints, construction material transitions, opening transitions, penetrations, and perimeter conditions without moisture deterioration and air leakage exceeding performance requirements.

B. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E 2357.

C. Fire Propagation Characteristics: Provide air barrier system qualified as a component of a comparable wall assembly that has been tested and passed NFPA 285.

2.4 MEMBRANE AIR BARRIER

A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier: Elastomeric, UV-resistant, synthetic membrane, formulated for application in a range of 48 - 70 mils (wet), 25 - 35 mils (dry)

1. Basis of Design Product: **Tremco, Inc., ExoAir 230**.
2. Air Permeance, ASTM E 2178: 0.004 cfm/sq. ft of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference, maximum.
3. Vapor Permeance, ASTM E 96/E96M: Minimum 12 perms (690 ng/Pa x s x sq. m).
4. Elongation, Ultimate, ASTM D 412, Die C: 600 percent, minimum.
5. Combustion Characteristics: Class A, flame spread, not greater than 25; smoke developed, not greater than 450, per ASTM E 84.

6. UV Resistance, QUV-B: Over 160 cycles of UV and water spray with no observable deterioration.
7. VOC Content: Less than 50 g/L.

2.5 ACCESSORY MATERIALS

A. General: Accessory materials as described in manufacturer's written installation instructions, recommended to produce complete air barrier assembly meeting performance requirements, and compatible with air barrier membrane material and adjacent materials.

B. Primer: Liquid primer meeting VOC limitations, recommended for substrate by membrane air barrier manufacturer, when installing modified bituminous self-adhered membranes.

1. Basis of Design Product: **Tremco, Inc., ExoAir Primer**

C. Transitions:
1. Counterflashing Strip: Modified bituminous, 40 mils (1.0 mm) thick self-adhering composite sheet consisting of 32 mils (0.8 mm) of SBS rubberized asphalt laminated to an 8 mils (0.2 mm) high-density, cross-laminated polyethylene film, for counterflashing of metal flashings and for substrate transitions and for termination of air barrier to bituminous roof membranes and to air barrier terminations at openings.
   a. Basis of Design Product: Tremco, Inc., ExoAir TWF Thru-Wall Flashing.
2. High Temperature Flashing Strip and Underlayment: Butyl, 24 mil thick self-adhering composite sheet consisting of 20 mils of butyl laminated to 4 mil polyethylene film; thermally stable under intermittent, non-continuous exposure up to 240 deg F (115 deg C).

   a. Basis of Design Product: **Tremco, Inc., ExoAir 110AT**.
3. Flashing Strip: Butyl, 22 mil thick self-adhering composite sheet consisting of 16 mils of butyl laminated to 6 mil polypropylene film; thermally stable under intermittent, non-continuous exposure up to 240 deg F (115 deg C)
4. Opening Transition Assembly: Cured low-modulus silicone extrusion, with reinforcing ribs, sized to fit opening widths, [with aluminum race for insertion into aluminum framing extrusions,] with the following characteristics:
   a. Basis of Design Product: Tremco, Inc., Proglaze ETA Engineered Transition Assembly. Tear Strength: 110 lb/in (19.3 kN/m)
5. Preformed Silicone-Sealant Extrusion: Manufacturer's standard system consisting of cured low-modulus silicone extrusion, sized to fit opening widths, with manufacturer's recommended silicone sealant for bonding extrusions to substrates.
   a. Basis of Design Product: Tremco, Inc.; Spectrem SimpleSeal.

D. Reinforcing Fabric: High strength mesh fabric consisting of open-weave glass fiber saturated with synthetic resins formulated for high moisture resistance, for reinforcing of liquid applications; not less than 2.5 oz/sq. yd (85 g/sq. m).

1. Basis of Design Product: **Tremco, Inc., Tremco 2011.**

E. Liquid Joint Sealants:
1. ASTM C 920, single-component polyurethane, approved by air barrier manufacturer for adhesion and compatibility with membrane air barrier and accessories.
   a. Basis of Design Product: **Tremco, Inc., Dymonic 100**.
2. ASTM C 920, single-component, neutral-curing silicone, approved by air barrier manufacturer for adhesion and compatibility with membrane air barrier and accessories post installation of the membrane.
   a. Basis of Design Product: **Tremco, Inc., Spectrem 1**.

F. Sprayed Polyurethane Foam Sealant: Sprayed Polyurethane Foam Sealant: Foamed-in-place, 1.5- to 2.0-lb/cu. ft. (24- to 32-kg/cu. m) density, with flame-spread index of 25 or less per ASTM E 162, for filling of gaps at openings and penetrations.

1. Basis of Design; Tremco Inc., Flexible Low Expanding Foam (LEF)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Surface Condition: Before applying air barrier materials, examine substrate and conditions to ensure substrates are fully cured, smooth, clean, dry, and free from high spots, depressions, loose and foreign particles and other deterrents to adhesion, and conditions comply with manufacturer's written recommendations.

1. Verify concrete and masonry surfaces are visibly dry, have cured for time period recommended by membrane air barrier manufacturer, and are free from release agents, curing agents, and other contaminates.

2. Test for capillary moisture by method recommended in writing by air barrier manufacturer..
3. Verify masonry joints are filled with mortar and struck flush.

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

3.2 INTERFACE WITH OTHER WORK

A. Commencement of Work: Commence work once air barrier substrates are adequately protected from weather and will remain protected during remainder of construction.

B. Sequencing of Work: Coordinate sequencing of air barrier work with work of other sections that form portions of building envelope air barrier to ensure that flashings and transition materials can be properly installed and inspected.

Roofing systems shall be capped and sealed, or top of walls protected, in such a way as to eliminate the ability of water to saturate the wall or interior space, both before and after, air barrier system installation. Coordinate installation of EXOAIR® 230 with the roofing trade to ensure compatibility and continuity with the roofing system.

C. Subsequent Work: Coordinate air barrier work with work of other sections installed subsequent to air barrier to ensure complete inspection of installed air barrier and sealing of air barrier penetrations necessitated by subsequent work.

3.3 PREPARATION

A. Clean, prepare, and treat substrate in accordance with air barrier manufacturer's written instructions.

1. Mask adjacent finished surfaces.
2. Remove contaminants and film-forming coatings from substrates.
3. Remove projections and excess materials and fill voids with substrate patching material.
4. Prepare and treat joints and cracks in substrate per ASTM C 1193 and membrane air barrier manufacturer's written instructions.

3.4 APPLICATION OF ACCESSORY MATERIALS

A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions. Install transition materials and other accessories to form connect and seal membrane air barrier material to adjacent components of building air barrier system, including, but not limited to, roofing system air barrier, exterior fenestration systems, door framing, and other openings.

B. Primer: Apply primer to substrates when recommended by air barrier manufacturer at required rate for those substrates that will be receiving a modified bituminous self-adhered membrane. Reprime areas not covered within 24 hours.

C. Assembly Transitions: 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.
1. Opening Transitions: Fill gaps at perimeter of openings with foam sealant and apply approved transition or accessory material
2. Penetrations: Fill gaps at perimeter of penetrations with foam sealant and level with approved sealant. or seal transition strips around penetrating objects and terminate with approved sealant.
3. Joints: Bridge and cover isolation joints, expansion joints, and discontinuous joints between separate assemblies utilizing approved transition or accessory materials.
4. Changes in Plane: Apply approved sealant beads at corners and edges to form smooth transition.

5. Substrate Gaps: Cover gaps with stainless steel sheet mechanically attached to substrate and providing continuous support for air barrier.

D. Flashings: Seal top of through-wall flashings to membrane air barrier with a continuous bead of approved sealant recommended by air barrier manufacturer.

E. Seal punctures, voids, and seams. Patch with approved transition and accessory materials following air barrier manufacturer’s recommendations and extend repair beyond repaired areas to maintain continuity.

3.5 FLUID AIR-BARRIER MEMBRANE INSTALLATION

A. General: Apply fluid air-barrier material to form a seal with transition materials and accessories to achieve a continuous air barrier according to air-barrier manufacturer's written instructions. Apply fluid air-barrier material within manufacturer's recommended application temperature ranges.

B. Membrane Air Barrier: Apply fluid air barrier material in full contact with substrate to produce a continuous seal according to membrane air barrier manufacturers written instructions.

1. Vapor-Permeable Membrane Air Barrier: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, -in a range of 25 – 35 mils (1.0-mm) dry film thickness depending on substrate, applied in one or more equal coats, roller- or spray- applied.

C. Connect and seal exterior wall air-barrier membrane continuously to subsequently-installed 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, wall openings, and other construction used in exterior wall openings, using approved transitions and accessory materials.

D. Wall Openings: Apply approved sealant to adhere silicone extrusion to perimeter of windows, curtain walls, storefronts, doors, and louvers. Apply [opening transition assembly] [preformed silicone sealant extrusion] according to air barrier transition manufacturer’s written instructions.

E. Seal punctures, voids, and seams. Patch with approved transition and accessory materials following air barrier manufacturer’s recommendations and extend repair beyond repaired areas to maintain continuity.

F. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.

G. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

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

B. Correction: Correct deficient applications not passing tests and inspections, make necessary repairs, and retest as required to demonstrate compliance with requirements.

3.7 CLEANING AND PROTECTING

A. Clean spills, stains, and overspray resulting application utilizing cleaning agents recommended by manufacturers of affected construction. Remove masking materials.

B. Protect membrane air barrier from damage from subsequent work. Protect membrane materials from exposure to UV light for period in excess of that acceptable to membrane air barrier manufacturer; replace overexposed materials and retest.

END OF SECTION

PART 4 -

**END OF SECTION**

# SECTION 07620

# SHEET METAL FLASHING AND TRIM

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Fabricated sheet metal items, including flashings, counterflashings, gutters, and downspouts.

B. Reglets and accessories.

C. Precast concrete splash pads.

D. Prefabricated, pre-finished copings.

### 1.02 RELATED SECTIONS

A. Section 07315 - Slate Shingles: Slate shingle system.

B. Section 07411 - Preformed Metal Roof Panels

C. Section 07710 - Manufactured Roof Specialties: Preformed flashings.

D. Section 07900 - Joint Sealers.

E. Section 09900 - Paints and Coatings: Field painting.

### 1.03 REFERENCES

A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2002.

B. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2003.

C. ASTM B 32 - Standard Specification for Solder Metal; 2003.

D. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 1997a.

E. ASTM D 4479 - Standard Specification for Asphalt Roof Coatings - Asbestos-Free; 2000.

F. ASTM D 4586 - Standard Specification for Asphalt Roof Cement, Asbestos-Free; 2000.

G. SMACNA (ASMM) - Architectural Sheet Metal Manual; Sheet Metal and Air Conditioning Contractors' National Association; 2003.

### 1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.

### 1.05 QUALITY ASSURANCE

A. Perform work in accordance with SMACNA Architectural Sheet Metal Manual requirements and standard details, except as otherwise indicated.

B. Fabricator and Installer Qualifications: Company specializing in sheet metal work with five years of documented experience.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.

B. Prevent contact with materials which may cause discoloration or staining.

## PART 2 PRODUCTS

### 2.01 SHEET MATERIALS

A. Galvanized Steel: ASTM A 653/A 653M, with G90/Z275 zinc coating; minimum 0.02 inch thick base metal.

B. Pre-Finished Galvanized Steel: ASTM A 653/A 653M, with G90/Z275 zinc coating; minimum 0.02 inch thick base metal, shop pre-coated with PVDF coating.
   1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system; color as scheduled.

### 2.02 ACCESSORIES

A. Fasteners: Galvanized steel, with soft neoprene washers.

B. Underlayment: ASTM D 226, organic roofing felt, Type I ("No. 15").

C. Primer: Zinc chromate type.

D. Protective Backing Paint: Asphaltic mastic, ASTM D 4479 Type I.

E. Sealant: Type specified in Section 07900.

F. Plastic Cement: ASTM D 4586, Type I.

G. Solder: ASTM B 32; Sn50 (50/50) type.

### 2.03 FABRICATION

A. Form sections true to shape, accurate in size, square, and free from distortion or defects.

B. Form pieces in longest possible lengths.

C. Hem exposed edges on underside 1/2 inch; miter and seam corners.

D. Form material with flat lock seams, except where otherwise indicated. At moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.

E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

F. Fabricate vertical faces with bottom edge formed outward 1/4 inch (6 mm) and hemmed to form drip.

G. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

### 2.04 GUTTER AND DOWNSPOUT FABRICATION

A. Gutters: Profile as indicated.

B. Downspouts: Profile as indicated.

C. Gutters and Downspouts: Size for rainfall intensity determined by a storm occurrence of 1 in 5 years in accordance with SMACNA Architectural Sheet Metal Manual.

D. Accessories: Profiled to suit gutters and downspouts.
   1. Downspout Supports: Brackets.

E. Seal metal joints.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.

B. Verify roofing termination and base flashings are in place, sealed, and secure.

### 3.02 PREPARATION

A. Install starter and edge strips, and cleats before starting installation.

B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

### 3.03 INSTALLATION

A. Conform to drawing details:

B. Secure flashings in place using concealed fasteners.

C. Apply plastic cement compound between metal flashings and felt flashings.

D. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.

E. Solder metal joints for full metal surface contact. After soldering, wash metal clean with neutralizing solution and rinse with water.

F. Secure gutters and downspouts in place using concealed fasteners.

G. Slope gutters 1/4 inch per foot minimum.

H. Set splash pads under downspouts.

### 3.04 FIELD QUALITY CONTROL

A. See Section 01400 - Quality Requirements, for field inspection requirements.

B. Inspection will involve surveillance of work during installation to ascertain compliance with specified requirements.

**END OF SECTION**

# SECTION 07650

# WALL FLASHING

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Section provides for flexible rubberized asphalt, self-sealing through-wall flashing and wall flashing accessories.

### 1.02 RELATED DOCUMENTS

A. Section 04720 – Cast Stone.

B. Section 04810 – Unit Masonry Assemblies.

C. Section 04851 –Stone Veneer.

### 1.02 REFERENCES

A. American Society for Testing and Materials
   1. ASTM E96 – Test Methods for Water Vapor Transmission of Materials
   2. ASTM D570 – Test Method for Water Absorption of Plastics
   3. ASTM E154 – Test Method for Water Vapor Retarders used in contact with Earth Under Concrete Slabs, on Walls or as Ground Cover
   4. ASTM D1004 – Test Method for Initial Tear Resistance of Plastic Film and Sheeting
   5. ASTM D1938 – Test Method for Tear Propagation Resistance of Plastic Film and Thin Sheeting by a Single-Tear Method
   6. ASTM D1876 – Test Method for Peel Resistance of Adhesives
   7. ASTM D1970 – Standard Specifications for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
   8. D412 – Test Methods for Vulcanized Rubber & Thermoplastic Rubbers and Thermoplastic Elastomers – Tension

### 1.03 SUBMITTALS

A. Product Data and Shop Drawings: Data Sheets, details and installation procedures.

B. Test Reports: Indicating compliance with the performance requirements of this section.

C. Samples of flashing.

### 1.05 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer’s recommendations for storage and handling of each product.

### 1.06 WARRANTY

A. Standard Product Warranty:
   1. Submit manufacturer’s warranty that flashing and accessories are free of defects at time of delivery, and are manufactured to meet manufacturer’s published physical properties and material specifications.
   2. Installer to warrant that flashing and accessories have been installed in accordance with manufacturer’s recommendations.

B. The Warranties submitted under this Section shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and the laws of governing jurisdictions and is in addition to and runs concurrently with other warranties made by the Contractor under requirements of the Contract Documents.

## PART 2 PRODUCTS

### 2.01 MATERIALS

A. Drawings and specifications are based on manufacturer's literature from W.R. Grace Building Products unless otherwise indicated. Other manufacturers to comply with the minimum levels of material and detailing indicated on the drawings and in conformance with provisions of Section 01600 – Product Requirements.

B. Flashing Description: 0.8 mm (32 mils) of self-adhesive rubberized asphalt integrally bonded to 0.2 mm (8 mils) of cross-laminated, high-density polyethylene film to provide a min. 1.0 mm (40 mil) thick membrane. Membrane shall be interleaved with disposable silicone-coated release paper until installed.

C. Performance Requirements:
   1. Water Vapor Transmission: ASTM E96, Method B – 2.9 ng/m2sPa (0.05 perms) maximum
   2. Water Absorption: ASTM D570 – Max. 0.1% by weight
   3. Puncture Resistance: ASTM E154 – 356 N (80 lbs)
   4. Tear Resistance:
      a. Initiation – ASTM D1004 – min. 58 N (13.0 lbs) M.D.
      b. Propagation – ASTM D1938 – min. 40 N (9.0 lbs) M.D.
   5. Lap Adhesion at -4ºC (25ºF): ASTM D1876 – 880 N/M (5.0 lbs/in.) of width
   6. Low Temperature Flexibility – ASTM D1970 – Unaffected to -43ºC (-45ºF)
   7. Tensile Strength: ASTM D412, Die C Modified – Min. 5.5 MPa (800 psi)
   8. Elongation, Ultimate Failure of Rubberized Asphalt: ASTM D412, Die C – Min. 200%

C. Product: Perm-A-Barrier® Wall Flashing manufactured by Grace Construction Products.
   1. Substitutions permitted under provisions of Section 01600.

D. Wall Flashing Accessories:
   1. Surface Conditioner:
      a. Description: Water-based latex liquid for substrate preparation.
         (1.) Flash Point: No flash to boiling point
         (2.) Solvent Type: Water
         (3.) VOC Content: Not to exceed 125 g/L
         (4.) Application Temperature: -4ºC (25ºF) and above
         (5.) Freeze/Thaw Stability: 5 cycles min.
         (6.) Freezing point (as packaged): -10ºC (14ºF)
      b. Product: Perm-A-Barrier Surface Conditioner manufactured by Grace Construction Products.
   2. Termination Mastic:
      a. Description: Rubberized asphalt-based mastic with 200 g/L max. VOC Content.
      b. Product: Bituthene® Mastic manufactured by Grace Construction Products.
   3. Optional Primer:
      a. Description: Water-based latex primer
         (1.) Specially designed for glass mat surfaced exterior gypsum boards
         (2.) VOC Content: Not to exceed 10 g/L
      b. Product: Perm-A-Barrier WB Primer by Grace Construction Products.
   4. Optional Primer:
      a. Description: Water-based latex primer with 110 g/L max. VOC content.
      b. Product: Bituthene Primer WP-3000 by Grace Construction Products.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Examine conditions, with installer present, for compliance with requirements for installation, tolerances and other specific conditions affecting performance of flashing. Remove all deleterious materials from surfaces to be flashed.

### 3.02 INSTALLATION

A. General: Install flashing to dry surfaces at air and surface temperatures of -4ºC (25ºF) and above in accordance with manufacturer's recommendations at locations indicated on Construction Documents.

B. Flexible Wall Flashing:
   1. Precut pieces of flashing to easily handled lengths for each location.
   2. Remove silicone-coated release paper and position flashing carefully before placing it against the surface.
   3. When properly positioned, place against surface by pressing firmly into place by hand roller. Fully adhere flashing to substrate to prevent water from migrating under flashing.
   4. Overlap adjacent pieces 50 mm (2 in.) and roll all seams with a steel hand roller.
   5. Trim bottom edge 13 mm (1⁄2 in.) back from exposed face of the wall. Flashing shall not be permanently exposed to sunlight.
   6. At heads, sills and all flashing terminations turn up ends a minimum of 50 mm (2 in.) and make careful folds to form an end dam, with the seams sealed.
   7. Do not allow the rubberized asphalt surface of the flashing membrane to come in contact with polysulfide sealants, creosote, uncured coal tar products or EPDM.
   8. Do not expose flashing membrane to sunlight for more than thirty days prior to enclosure.

C. Accessories:
   1. When required by dirty or dusty site conditions or by surfaces having irregular or rough texture, apply surface conditioner by spray, brush, or roller at the rate recommended by manufacturer, prior to flashing installation. Allow surface conditioner to dry completely before flashing application.
   2. Apply a bead or trowel coat of mastic along flashing top edge, seams, cuts, and penetrations.

**END OF SECTION**

# SECTION 07900

# JOINT SEALERS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Sealants and joint backing.

B. Precompressed foam sealers.

### 1.02 RELATED SECTIONS

A. Section 07840 - Firestopping: Firestopping sealants.

B. Section 08800 - Glazing: Glazing sealants and accessories.

C. Section 09300 - Tile: Sealant used as tile grout.

### 1.03 REFERENCES

A. ASTM C 834 - Standard Specification for Latex Sealants; 2000.

B. ASTM C 919 - Standard Practice for Use of Sealants in Acoustical Applications; 2002.

C. ASTM C 920 - Standard Specification for Elastomeric Joint Sealants; 2002.

D. ASTM C 1193 - Standard Guide for Use of Joint Sealants; 2000.

E. ASTM D 1056 - Standard Specification for Flexible Cellular Materials--Sponge or Expanded Rubber; 2000.

### 1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data indicating sealant chemical characteristics.

C. Manufacturer's Installation Instructions: Indicate special procedures.

### 1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years experience.

### 1.06 MOCK-UP

A. Mock-ups specified in Section 01410.

### 1.07 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature and humidity recommended by the sealant manufacturer during and after installation.

### 1.08 COORDINATION

A. Coordinate the work with all sections referencing this section.

### 1.09 WARRANTY

A. See Section 01780 - Closeout Submittals, for additional warranty requirements.

B. Correct defective work within a five year period after Date of Substantial Completion.

C. Warranty: Include coverage for installed sealants and accessories which fail to achieve airtight seal, exhibit loss of adhesion or cohesion, or do not cure.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Silicone Sealants:
   1. Bostik Findley: www.bostikfindley-us.com.
   2. GE Plastics: www.geplastics.com.
   3. Pecora Corporation: www.pecora.com.
   4. Degussa Building Systems/Sonneborn: www.chemrex.com.
   5. Substitutions: See Section 01600 - Product Requirements.

B. Polyurethane Sealants:
   1. Bostik Findley: www.bostikfindley-us.com.
   2. Pecora Corporation: www.pecora.com.
   3. Degussa Building Systems/Sonneborn: www.chemrex.com.
   4. Substitutions: See Section 01600 - Product Requirements.

C. Butyl Sealants:
   1. Bostik Findley: www.bostikfindley-us.com.
   2. Pecora Corporation: www.pecora.com.
   3. Substitutions: See Section 01600 - Product Requirements.

D. Acrylic Emulsion Latex Sealants:
   1. Bostik Findley: www.bostikfindley-us.com.
   2. Pecora Corporation: www.pecora.com.
   3. Degussa Building Systems/Sonneborn: www.chemrex.com.
   4. Substitutions: See Section 01600 - Product Requirements.

E. Preformed Compressible Foam Sealers:
   1. Emseal Joint Systems, Ltd: www.emseal.com.
   2. Sandell Manufacturing Company, Inc: www.sandellmfg.com.
   3. Dayton Superior Chemical Division (Polytite): www.daytonsuperiorchemical.com.
   4. Substitutions: See Section 01600 - Product Requirements.

### 2.02 SEALANTS

A. General Purpose Exterior Sealant: Polyurethane; ASTM C 920, Grade NS, Class 25, Uses M, G, and A; single component.
   1. Color: Standard colors matching finished surfaces.
   2. Applications: Use for:
      a. Control, expansion, and soft joints in masonry.
      b. Joints between concrete and other materials.
      c. Joints between metal frames and other materials.
      d. Other exterior joints for which no other sealant is indicated.

B. Exterior Expansion Joint Sealer: Precompressed foam sealer; urethane with water-repellent;
   1. Color: Selected by Architect.
   2. Size as required to provide weathertight seal when installed.
   3. Provide product recommended by manufacturer for traffic-bearing use.
   4. Applications: Use for:
      a. Exterior wall expansion joints.

C. Exterior Metal Lap Joint Sealant: Butyl or polyisobutylene, nondrying, nonskinning, noncuring.
   1. Applications: Use for:
      a. Concealed sealant bead in sheet metal work.
      b. Concealed sealant bead in siding overlaps.

D. General Purpose Interior Sealant: Acrylic emulsion latex; ASTM C 834, Type OP, Grade NF single component, paintable.
   1. Color: Standard colors matching finished surfaces.
   2. Applications: Use for:
      a. Interior wall and ceiling control joints.
      b. Joints between door and window frames and wall surfaces.
      c. Other interior joints for which no other type of sealant is indicated.

E. Bathtub/Tile Sealant: White silicone; ASTM C 920, Uses I, M and A; single component, mildew resistant.
   1. Applications: Use for:
      a. Joints between plumbing fixtures and floor and wall surfaces.
      b. Joints between kitchen and bath countertops and wall surfaces.

F. Acoustical Sealant: Butyl or acrylic sealant; ASTM C 920, Grade NS, Class 12-1/2, Uses M and A; single component, solvent release curing, non-skinning.
   1. Applications: Use for concealed locations only:
      a. Sealant bead between top stud runner and structure and between bottom stud track and floor.

G. Concrete Paving Joint Sealant: Polyurethane, self-leveling; ASTM C 920, Class 25, Uses T, I, M and A; single component.
   1. Color: Gray.
   2. Applications: Use for:
      a. Joints in sidewalks and vehicular paving.

**2.03 ACCESSORIES**

A. Primer: Non-staining type, recommended by sealant manufacturer to suit application.

B. Joint Cleaner: Non-corrosive and non-staining type, recommended by sealant manufacturer; compatible with joint forming materials.

C. Joint Backing: Round foam rod compatible with sealant; ASTM D 1056, sponge or expanded rubber; oversized 30 to 50 percent larger than joint width.

D. Bond Breaker: Pressure sensitive tape recommended by sealant manufacturer to suit application.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that substrate surfaces are ready to receive work.

B. Verify that joint backing and release tapes are compatible with sealant.

**3.02 PREPARATION**

A. Remove loose materials and foreign matter which might impair adhesion of sealant.

B. Clean and prime joints in accordance with manufacturer's instructions.

C. Perform preparation in accordance with manufacturer's instructions and ASTM C 1193.

D. Protect elements surrounding the work of this section from damage or disfigurement.

**3.03 INSTALLATION**

A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.

B. Perform installation in accordance with ASTM C 1193.

C. Perform acoustical sealant application work in accordance with ASTM C 919.

D. Measure joint dimensions and size joint backers to achieve width-to-depth ratio, neck dimension, and surface bond area as recommended by manufacturer, except where specific dimensions are indicated.

E. Install bond breaker where joint backing is not used.

F. Install sealant free of air pockets, foreign embedded matter, ridges, and sags.

G. Apply sealant within recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

H. Tool joints concave.

I. Precompressed Foam Sealant: Do not stretch; avoid joints except at corners, ends, and intersections; install with face 1/8 to 1/4 inch below adjoining surface.

**3.04 CLEANING**

A. Clean adjacent soiled surfaces.

**3.05 PROTECTION OF FINISHED WORK**

A. Protect sealants until cured.

**END OF SECTION**

# SECTION 08110

# STEEL DOORS AND FRAMES

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Non-fire-rated steel doors and frames.

B. Steel frames for wood doors.

C. Fire-rated steel doors and frames.

D. Thermally insulated steel doors.

E. Steel glazing frames.

F. Accessories, including glazing, louvers, and matching panels.

### 1.02 RELATED SECTIONS

A. Section 08710 - Door Hardware.

B. Section 08800 - Glazing: Glass for doors and borrowed lites.

C. Section 09900 - Paints and Coatings: Field painting.

### 1.03 REFERENCES

A. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 1998.

B. ANSI A250.8 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames; 1998.

C. ANSI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 1998.

D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2002a.

E. DHI A115 Series - Specifications for Steel Doors and Frame Preparation for Hardware; Door and Hardware Institute; current edition (ANSI/DHI A115 Series).

F. NAAMM HMMA 840 - Installation and Storage of Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 1999.

G. NAAMM HMMA 860 - Guide Specifications for Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 1992.

H. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; The National Association of Architectural Metal Manufacturers; 2000.

I. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association; 1999.

J. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; National Fire Protection Association; 2003.

K. UBC Std 7-2, Part II - Test Standard for Smoke- and Draft-control Assemblies; International Conference of Building Officials; 1997.

L. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

### 1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements for submittal procedures.

B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes.

C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and identifying location of different finishes, if any.

D. Installation Instructions: Manufacturer's published instructions, including any special installation instructions relating to this project.

E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

### 1.05 QUALITY ASSURANCE

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum five years documented experience.

B. Maintain at the project site a copy of all reference standards dealing with installation.

### 1.06 DELIVERY, STORAGE, AND PROTECTION

A. Store in accordance with NAAMM HMMA 840.

B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Steel Doors and Frames:
   1. Ceco Door Products: www.cecodoor.com.
   2. Republic Builders Products: www.republicdoor.com.
   3. Steelcraft: www.steelcraft.com.
   4. Substitutions: See Section 01600 – Product Requirements.

### 2.02 DOORS AND FRAMES

A. Requirements for All Doors and Frames:
   1. Accessibility: Comply with ANSI/ICC A117.1.
   2. Door Top Closures: Flush with top of faces and edges.
   3. Door Edge Profile: Beveled on both edges.
   4. Door Texture: Smooth faces.
   5. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings.
   6. Hardware Preparation: In accordance with DHI A115 Series, with reinforcement welded in place, in addition to other requirements specified in door grade standard.
   7. Finish: Factory primed, for field finishing.

B. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with all the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

## 2.03 STEEL DOORS

A. Exterior Doors:
   1. Grade: NAAMM HMMA 861, physical performance Level A.
   2. Core: Polystyrene foam.
   3. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.

B. Interior Doors, Non-Fire-Rated:
   1. Grade: NAAMM HMMA 860, physical performance Level A.
   2. Core: Polystyrene foam.
   3. Thickness: 1-3/4 inches.

C. Interior Doors, Fire-Rated:
   1. Grade: NAAMM HMMA 861, physical performance Level A.
   2. Fire Rating: As indicated on Door and Frame Schedule, with temperature rise ratings as required by code, tested in accordance with NFPA 252.
      a. Provide units listed and labeled by UL.
      b. Attach fire rating label to each fire rated unit.
   3. Smoke and Draft Control Doors: In addition to required fire rating, comply with air leakage requirements of UBC Std 7-2, Part II; with "S" label; if necessary, provide additional gasketing or edge sealing.
   4. Core: Mineral fiberboard.

D. Panels: Same construction, performance, and finish as doors.

## 2.04 STEEL FRAMES

A. General:
   1. Comply with the requirements of grade specified for corresponding door, except:
      a. Frames for Wood Doors: Comply with frame requirements specified in NAAMM HMMA 861
   2. Finish: Same as for door.
   3. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
   4. Frames in Masonry Walls: Size to suit masonry coursing with head member 2 inches high to fill opening without cutting masonry units.
   5. Frames Wider than 48 Inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

B. Exterior Door Frames: Face welded, seamless with joints filled.
   1. Galvanizing: All components hot-dipped zinc-iron alloy-coated (galvannealed) in accordance with ASTM A 653/A 653M, with manufacturer's standard coating thickness.
   2. Weatherstripping: Separate, see Section 08710.

C. Interior Door Frames, Non-Fire-Rated: Fully welded type.
   1. Terminated Stops: Provide at all interior doors; closed end stop terminated 6 inches above floor at 45 degree angle.

D. Interior Door Frames, Fire-Rated: Fully welded type.
   1. Fire Rating: Same as door, labeled.

E. Frames for Interior Glazing or Borrowed Lights: Construction and face dimensions to match door frames, and as indicated on drawings.

### 2.05 ACCESSORY MATERIALS

A. Glazing: As specified in Section 08800, factory installed.

B. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.

C. Grout for Frames: Portland cement grout of maximum 4-inch slump for hand troweling; thinner pumpable grout is prohibited.

D. Silencers: Resilient rubber, fitted into drilled hole; 3 on strike side of single door, 3 on center mullion of pairs, and 2 on head of pairs without center mullions.

E. Temporary Frame Spreaders: Provide for all factory- or shop-assembled frames.

### 2.06 FINISH MATERIALS

A. Primer: Rust-inhibiting, complying with ANSI A250.10, door manufacturer's standard.

B. Bituminous Coating: Asphalt emulsion or other high-build, water-resistant, resilient coating.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

### 3.02 PREPARATION

A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

### 3.03 INSTALLATION

A. Install in accordance with the requirements of the specified door grade standard and NAAMM HMMA 840.

B. In addition, install fire rated units in accordance with NFPA 80.

C. Coordinate frame anchor placement with wall construction. Provide minimum 3 anchors per jamb.

D. Grout frames in masonry and concrete construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.

E. Coordinate installation of hardware.

F. Coordinate installation of glazing.

### 3.04 ERECTION TOLERANCES

A. Clearances Between Door and Frame: As specified in ANSI A250.8.

B. Maximum Diagonal Distortion: 1/16 in measured with straight edge, corner to corner.

### 3.05 ADJUSTING

A. Adjust for smooth and balanced door movement.

### 3.06 SCHEDULE

A. Refer to Door and Frame Schedule on the drawings.

**END OF SECTION**

# SECTION 08211

# FLUSH WOOD DOORS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Flush wood doors; flush configuration with applied moldings; fire rated and non-rated.

### 1.02 RELATED SECTIONS

A. Section 08110 - Steel Doors and Frames.

B. Section 08710 - Door Hardware.

C. Section 08800 - Glazing.

D. Section 09900 - Paints and Coatings: Site finishing of doors.

### 1.03 REFERENCES

A. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2003.

B. ICC (IBC) - International Building Code; 2003.

C. ITS (DIR) - Directory of Listed Products; Intertek Testing Services NA, Inc.; current edition.

D. NFPA 80 - Standard for Fire Doors and Fire Windows; National Fire Protection Association; 1999.

E. UL (BMD) - Building Materials Directory; Underwriters Laboratories Inc.; current edition.

### 1.04 SUBMITTALS

A. See Section 01300 – Administrative Requirements for submittal procedures.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria.

D. Manufacturer's Installation Instructions: Indicate special installation instructions.

### 1.05 QUALITY ASSURANCE

A. Maintain one copy of the specified door quality standard on site for review during installation and finishing.

B. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.

C. Installed Fire Rated Door and Transom Panel Assembly: Conform to NFPA 80 for fire rated class as indicated.

### 1.06 DELIVERY, STORAGE, AND PROTECTION

A. Package, deliver and store doors in accordance with specified quality standard.

B. Accept doors on site in manufacturer's packaging. Inspect for damage.

C. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

### 1.07 PROJECT CONDITIONS

A. Coordinate the work with door opening construction, door frame and door hardware installation.

### 1.08 WARRANTY

A. See Section 01780 – Closeout Submittals for additional warranty requirements.

B. Provide warranty for the following term:
   1. Interior Doors: Life of installation.

C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Veneer Doors:
   1. Eggers Industries: www.eggersindustries.com.
   2. Haley Brothers: www.haleybros.com.
   3. Marshfield DoorSystems, Inc: www.marshfielddoors.com. (formerly Weyerhaeuser Door Division)
   4. Substitutions: See Section 01600 – Product Requirements.

### 2.02 DOORS AND PANELS

A. All Doors: See drawings for locations and additional requirements.
   1. Quality Standard: AWI/AWMAC Architectural Woodwork Quality Standards Illustrated, Section 1300, Custom Grade.
   2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.

B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
   1. Provide solid core doors at all locations.
   2. Fire Rated Doors: Tested to ratings indicated on drawings in accordance with International Building Code ("positive pressure"); UL or WH (ITS) labeled without any visible seals when door is open.
   3. Smoke and Draft Control Doors: Tested to ratings indicated on drawings in accordance with International Building Code; UL labeled if required by applicable code; provide gasketing as specified by listing.
   4. Wood Veneer Facing
      a. Transparent finish doors: Red Oak veneer, slip matched and factory finished. Stain color selected by Architect. Meet specified requirements for Custom Grade.
      b. Painted wood doors: Birch veneer, rotary cut. Meet specified requirements for Custom Grade.
   5. Facing Adhesive: Type I – waterproof.

### 2.03 DOOR AND PANEL CORES

A. Non-Rated Solid Core and 20 Minute Rated Doors: Type SLC, staved lumber core, plies and faces as indicated above.

B. Fire Rated Doors: Mineral core, Type FD, plies and faces as indicated above.

### 2.04 ACCESSORIES

A. Glazing Stops: Rolled steel channel shape, mitered corners; prepared for countersink style tamper proof screws.

B. Astragals for Non-Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge.

C. Astragals for Fire Rated Double Doors: Steel, T shaped, overlapping and recessed at face edge, specifically for double doors.

### 2.05 DOOR CONSTRUCTION

A. Fabricate doors in accordance with door quality standard specified.

B. Provide solid blocks at lock edge for hardware reinforcement.
   1. Provide solid blocking for other throughbolted hardware.

C. Fit door edge trim to edge of stiles after applying veneer facing.

D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.

E. Factory fit doors for frame opening dimensions identified on shop drawings.

F. Cut and configure exterior door edge to receive recessed weatherstripping devices.

G. Provide edge clearances in accordance with AWI Quality Standards Illustrated Section 1700.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

### 3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and specified quality standard.
   1. Install fire-rated doors in accordance with NFPA 80 requirements.

B. Trim door height by cutting bottom edges to a maximum of 3/4 inch (19 mm).
   1. Trim fire door height at bottom edge only, in accordance with fire rating requirements.

C. Use machine tools to cut or drill for hardware.

D. Coordinate installation of doors with installation of frames and hardware.

E. Coordinate installation of glazing.

**3.03 INSTALLATION TOLERANCES**

A. Maximum Diagonal Distortion (Warp): 1/8 inch measured with straight edge or taut string, corner to corner, over an imaginary 36 x 84 inches surface area.

B. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taut string, top to bottom, over an imaginary 36 x 84 inches surface area.

C. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over an imaginary 36 x 84 inches surface area.

**3.04 ADJUSTING**

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

**3.05 SCHEDULE -** See Drawings

**END OF SECTION**

# SECTION 08212

# STILE AND RAIL WOOD DOORS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Wood doors, stile and rail design.

B. Panels of wood and glass.

### 1.02 RELATED SECTIONS

A. Section 06200 - Finish Carpentry: Wood door frames.

B. Section 08110 - Steel Doors and Frames.

C. Section 08710 - Door Hardware.

D. Section 08800 - Glazing.

E. Section 09900 - Paints and Coatings: Site finishing doors.

### 1.03 REFERENCES

A. AWI/AWMAC (QSI) - Architectural Woodwork Quality Standards Illustrated; Architectural Woodwork Institute and Architectural Woodwork Manufacturers Association of Canada; 2003.

### 1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements for submittal procedures.

B. Product Data: Indicate stile and rail core materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, undercuts required, special beveling, special blocking for hardware, factory machining criteria, factory finishing criteria, identify cutouts for glazing.

D. Samples: Submit two samples of door veneer, 12 x 12 inch in size illustrating wood grain, stain color, and sheen.

E. Manufacturer's Installation Instructions: Indicate special installation instructions.

### 1.05 QUALITY ASSURANCE

A. Perform work in accordance with AWI/AWMAC Quality Standards Illustrated, Section 1400, Premium grade.

B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years of documented experience.

### 1.06 DELIVERY, STORAGE, AND PROTECTION

A. Package, deliver and store doors in accordance with AWI/AWMAC Quality Standards Illustrated, Section 1300.

B. Protect doors with resilient packaging sealed with heat shrunk plastic. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges with tinted sealer if stored more than one week. Break seal on site to permit ventilation.

### 1.07 PROJECT CONDITIONS

A. Coordinate the work with door opening construction, door frame and door hardware

installation.

### 1.08 WARRANTY

A. See Section 01780 - Closeout Submittals for additional warranty requirements.

B. Provide warranty to the following term:
   1. Interior Doors: Life of installation years.

C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Stile and Rail Wood Doors:
   1. Algoma Hardwoods: www.algomahardwoods.com
   2. Eggers Industries: www.eggersindustries.com.
   3. Enjo Architectural Millwork: www.enjo.com.
   4. The Maiman Company: www.maiman.com.
   5. Substitutions: See Section 01600 - Product Requirements.

### 2.02 DOOR TYPES

A. Interior Doors: 1-3/4 inches thick unless otherwise indicated; solid lumber construction; mortised and tenoned joints.

### 2.03 DOOR AND PANEL FACING

A. Interior Doors: Wood red oak wood doors, provide smooth wood grain finish.

B. Adhesive: Type I - waterproof.

### 2.04 ACCESSORIES

A. Molding: Wood, of same species as door facing, indicated shape, mitered corners; prepared for countersink style tamper proof screws.

### 2.05 FABRICATION

A. Fabricate doors in accordance with AWI Quality Standards requirements.

B. Vertical Exposed Edge of Stiles: Of same species as veneer facing.

C. Bond edge banding to cores.

D. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.

E. Factory fit doors for frame opening dimensions identified on shop drawings.

### 2.06 FINISH

A. Factory Stained, stain color to be selected by Architect from standard stain finishes.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that opening sizes and tolerances are acceptable.

C. Do not install doors in frame openings that are not plumb or are out of tolerance for size or alignment.

### 3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions and AWI Quality Standards requirements.

B. Trim door width by cutting equally on both jamb edges.

C. Trim door height by cutting bottom edges to a maximum of 3/4 inch.

D. Machine cut for hardware.

E. Coordinate installation of doors with installation of frames and hardware.

F. Coordinate installation of glazing.

### 3.03 INSTALLATION TOLERANCES

A. Conform to AWI requirements for fit, clearance, and joinery tolerances.

B. Maximum Diagonal Distortion (Warp): 1/8 inch measured with straight edge or taut string, corner to corner, over an imaginary 36 x 84 inch surface area.

C. Maximum Vertical Distortion (Bow): 1/8 inch measured with straight edge or taut string, top to bottom, over an imaginary 36 x 84 inch surface area.

D. Maximum Width Distortion (Cup): 1/8 inch measured with straight edge or taut string, edge to edge, over an imaginary 36 x 84 inch surface area.

### 3.04 ADJUSTING

A. Adjust doors for smooth and balanced door movement.

B. Adjust closers for full closure.

**END OF SECTION**

# SECTION 08310

# ACCESS DOORS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Fire rated and non-rated access door and frame units

B. Wall and ceiling locations

### 1.02 RELATED SECTIONS

A. Section 03300 – Cast-in-Place Concrete: openings in concrete

B. Section 04810 – Unit Masonry System: openings in masonry

C. Section 04851 – Cut Stone Veneer: openings in cut stone

D. Section 09260 – Gypsum Board Assemblies: openings in partitions

E. Section 09511 – Suspended Acoustical Ceilings: openings in ceilings

F. Section 09900 – Paints & Coatings: field paint finish

### 1.03 REFERENCES

A. UL – Fire Resistance Directory

B. Warnock Hersey – Certification Listings

### 1.04 SUBMITTALS FOR REVIEW

A. Section 01300 – Administrative Requirements: submittals and review procedures

B. Product Data: provides sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

C. Shop Drawings: Indicate exact position of all access door units

D. Samples: Sudmit two access units, 12x12 inch in size illustrating frame configuration, anchors, & finishes

### 1.05 SUBMITTALS FOR INFORMATION

A. Section 01300 – Administrative Requirements: submittals and review procedures

B. Manufacturer's Installation Instructions: Indicate installation requirements, rough-in dimensions and any special requirements

### 1.06 SUBMITTALS AT PROJECT CLOSEOUT

A. Section 01780 – Closeout Submittals

B. Record actual locations of all access units

### 1.07 QUALITY ASSURANCE

A. Perform work in accordance with Underwriters Laboratories and Warnock Hersey Design requirements. Maintain one (1) copy on site.

### 1.08 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated access doors

B. Provide certificate of compliance from authority having jurisdiction indicating approval of fire rated access doors.

### 1.09 PROJECT CONDITIONS

A. Section 01700: Execution Requirements

B. Coordinate the work with other work requiring access doors

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS – WALL AND CEILING UNITS

A. Karp Associates, Inc.

B. J.L. Industries, Inc.

C. Section 01600 – Product Requirements: product substitutions. Substitutions permitted.

### 2.02 ACCESS UNITS - WALLS

A. Non-fire Rated Door and Frame Unit: Formed steel
   1. In Cast-in-place Concrete: Model DSC-214M manufactured by Karp
   2. In Masonry: Model DSC-214M manufactured by Karp
   3. In Cut Stone: Model DSC-214M manufactured by Karp
   4. In Gypsum Board: Model DSC-214M manufactured by Karp

B. Fire Rated Door and Frame Unit: Formed steel, finish: 1-1/2 hour B label fire rating
   1. In Cast-in-place Concrete: Model KRP-150FR manufactured by Karp
   2. In Masonry: Model KRP-150FR manufactured by Karp
   3. In Cut Stone: Model KRP-150FR manufactured by Karp
   4. In Gypsum Board: Model KRP-150FR manufactured by Karp

### 2.03 ACCESS UNITS - CEILINGS

A. Non-fire Rated Door and Frame Unit: Formed steel
   1. In Gypsum Board on Steel Studs: Model DSC-214M manufactured by Karp
   2. In Metal T-bar Suspended Acoustical Tile: Model NZW manufactured by Daiken-Hatch

B. Fire Rated Door and Frame Unit: Formed steel, finish: 1-1/2 hour B label fire rating
   1. In Gypsum Board on Steel Studs: Model KRP-150FR manufactured by Karp
   2. In Metal T-bar Suspended Acoustical Tile: Model NZW manufactured by Daiken-Hatch

### 2.04 FABRICATION- WALL AND CEILING UNITS

A. Fabricate frames and flanges of 16 gauge steel

B. Fabricate door panels of 20 gauge steel for non-fire rated and 16 gauge steel for fire-rated applications.

C. Weld, fill, and grind joints to ensure flush and square unit.

D. Hardware:
   1. Hinge: 175 degree continuous piano hinge
   2. Lock cylinder: Lock with latch, two (2) keys for each unit.

### 1.07 FINISHES

A. Base Metal Protection: Prime coat of rust inhibitive electrostatic powder baked grey enamel.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Section 01300 – Administrative Requirements: verification of existing conditions before staring work.

B. Verify that rough openings for door and frame are correctly sized and located.

### 3.01 INSTALLATION

A. Install units in accordance with manufacturer's instructions.

B. Install frames plumb and level in opening. Secure rigidly in place.

C. Position unit to provide convenient access to concealed work requiring access.

**END OF SECTION**

# SECTION 08410

# ALUMINUM STOREFRONTS

## PART 1 - GENERAL

### 1.01 SECTION INCLUDES

A. Section Includes Architectural Aluminum Storefront Systems, including perimeter trims, stools, accessories, shims and anchors, and perimeter sealing of storefront units.

B. Related Sections:
   1. Section 07900 - Joint Sealants
   2. Section 08700 - Door Hardware
   3. Section 08800 - Glass and Glazing

### 1.02 SYSTEM DESCRIPTION

A. Storefront System Performance Requirements:
   1. Wind loads: Provide framing system; include anchorage, capable of withstanding wind load design pressures complying with applicable codes
   2. Air Infiltration: The test specimen shall be tested in accordance with ASTM E 283. Air infiltration rate shall not exceed 0.06 cfm/ft2 at a static air pressure differential of 6.24 psf.
   3. Water Resistance: The test specimen shall be tested in accordance with ASTM E 331. There shall be no leakage at a minimum static air pressure differential of 8 psf as defined in AAMA 501.
   4. Uniform Load: A static air design load of 20 psf shall be applied in the positive and negative direction in accordance with ASTM E 330. There shall be no deflection in excess of L/175 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage or permanent set in the framing members in excess of 0.2% of their clear spans shall occur.
   5. Thermal Transmittance (U-factor): When tested to AAMA Specification 1503, the thermal transmittance (U-factor) shall not be more than:
      a. Glass to Exterior – 0.47 (low-e) or 0.61 (clear) BTU/hr/ft2/°F.
      b. Glass to Center – 0.44 (low-e) or 0.61 (clear) BTU/hr/ft2/°F.
      c. Glass to Interior – 0.41 (low-e) or 0.56 (clear) BTU/hr/ft2/°F.
   6. Condensation Resistance (CRF): When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:
      a. Glass to Exterior – 70frame and 69glass (low-e) or 69 frame and 58 glass (clear).
      b. Glass to Center – 62 frame and 68glass (low-e) or 63 frame and 56 glass (clear).
      c. Glass to Interior – 56 frame and 67 glass (low-e) or 54 frame and 58 glass (clear).

### 1.03 SUBMITTALS

A. General: Prepare, review, approve, and submit specified submittals in accordance with "Conditions of the Contract" and Division 1 Submittals Sections. Product data, shop drawings, samples, and similar submittals are defined in "Conditions of the Contract."

B. Quality Assurance/Control Submittals:
   1. Test Reports: Submit certified test reports showing compliance with specified performance characteristics.

## 1.04 WARRANTY

A. Project Warranty: Refer to "Conditions of the Contract" for project warranty provisions.

B. Manufacturer's Product Warranty: Submit, for Owner's acceptance, manufacturer's warranty for entrance system as follows:
   1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by Kawneer. In addition, welded door corner construction shall be supported with a limited lifetime warranty for the life of the door under normal use.

C. The Warranties submitted under this Section shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and the laws of governing jurisdictions and is in addition to and runs concurrently with other warranties made by the Contractor under requirements of the Contract Documents.

## 1.05 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications: Installer experienced to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to product manufacturer.
   2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction, approving acceptable installer and approving application method.

B. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

## 1.06 DELIVERY, STORAGE, AND HANDLING

A. Ordering: Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

B. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle framing material and components to avoid damage. Protect framing material against damage from elements, construction activities, and other hazards before, during and after framing installation.

# PART 2 - PRODUCTS

## 2.01 ACCEPTABLE MANUFACTURERS

B. Acceptable Product:
   1. Aluminum Storefront Systems. Kawneer – basis of design
      a. Aluminum Storefront System
      c. Framing Member Profile: 2" x 4-1/2" nominal dimension and as detailed on the drawings.
      d. Finish/Color: dark bronze anodized aluminum

B. Equivalent products by the following manufacturers are acceptable:
   1. Vistawall Architectural Products.
   2. YKK AP America, Inc.
   3. Old Castle Inc.

## 2.02 MATERIALS

A. Aluminum (Framing and Components):
   1. Material Standard: ASTM B 221; 6063-T6 alloy and temper
   2. Member Wall Thickness: Each framing member shall provide structural strength to meet specified performance requirements.
   3. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of storefront members are nominal and in compliance with AA Aluminum Standards and Data.

## 2.02 COMPONENTS

## 2.03 ACCESSORIES

A. Fasteners: Where exposed, shall be Stainless Steel.

B. Gaskets: Glazing gaskets shall be extruded EPDM rubber.

C. Perimeter Anchors: Aluminum. When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

D. Thermal Barrier (Trifab® VG 451T):
   1. Kawneer IsoLock® Thermal Break with a 1/4" separation consisting of a two part chemically curing, high density polyurethane which is mechanically and adhesively joined to aluminum storefront sections.
      a. Thermal Break shall be designed in accordance with AAMA TIR-A8 and tested in accordance with AAMA 505.

## 2.04 RELATED MATERIALS

A. Sealants: Refer to Joint Treatment (Sealants) Section.

B. Glass: Refer to Glass and Glazing Section.

## 2.05 FABRICATION

A. General:
   1. Fabricate components per manufacturer's installation instructions and with minimum clearances and shim spacing around perimeter of assembly, yet enabling installation and dynamic movement of perimeter seal.
   2. Accurately fit and secure joints and corners. Make joints flush, hairline and weatherproof.
   3. Prepare components to receive anchor devices. Fabricate anchors.
   4. Arrange fasteners and attachments to conceal from view.

## 2.06 FINISHES

A. Factory Finishing:
   1. Clear Anodized Aluminum

## 2.07 SOURCE QUALITY CONTROL

A. Source Quality: Provide aluminum framing specified herein from a single source.
   1. Building Enclosure System: When aluminum framing is part of a building enclosure system, including entrances, entrance hardware, windows, curtain wall system and related products, provide building enclosure system products from a single source manufacturer.

B. Fabrication Tolerances: Fabricate aluminum framing in accordance with framing manufacturer's prescribed tolerances.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions. Verify openings are sized to receive storefront system and sill plate is level in accordance with manufacturer's acceptable tolerances.
   1. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

### 3.02 INSTALLATION

A. General: Install framing system in accordance with manufacturer's instructions and AAMA storefront and entrance guide specifications manual.
   1. Dissimilar Materials: Provide separation of aluminum materials from sources of corrosion or electrolytic action contact points.
   2. Weathertight Construction: Install sill members and other members in a bed of sealant or with joint filler or gaskets, to provide weathertight construction. Coordinate installation with wall flashings and other components of construction.
   3. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
   4. Provide alignment attachments and shims to permanently fasten system to building structure.
   5. Align assembly plumb and level, free of warp and twist. Maintain assembly dimensional tolerances aligning with adjacent work.

B. Related Products Installation Requirements:
   1. Sealants (Perimeter): Refer to Section 7 Joint Treatment (Sealants).
   2. Glass: Refer to Section 8 Glass and Glazing.
      a. Reference: ANSI Z97.1, CPSC 16 CFR 1201 and GANA Glazing Manual.

### 3.03 PROTECTION AND CLEANING

A. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum storefront system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

B. Cleaning: Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

**END OF SECTION**

# SECTION 08411

# ALUMINUM ENTRANCES

## PART 1 – GENERAL

### 1.01 SECTION INCLUDES

A. Section Includes: Aluminum Entrances, glass and glazing, and door hardware and components.

B. Related Sections:
   1. Section 08410 – Aluminum Storefronts
   2. Section 08700 – Finish Hardware

### 1.02 SYSTEM DESCRIPTION

A. Entrance Performance Requirements:
   1. Air Infiltration: For single acting offset pivot or butt hung entrances in the closed and locked position, the test specimen shall be tested in accordance with ASTM E 283 at a pressure differential of 6.24 psf. A single 3'0" x 7'0" entrance door and frame shall not exceed 0.50 cfm per linear foot of perimeter crack.
   2. Structural: Corner strength shall be tested per Kawneer's dual moment load test procedure and certified by an independent testing laboratory to ensure weld compliance and corner integrity Testing procedure and certified test results available upon request.

### 1.03 SUBMITTALS

A. General: Prepare, review, approve, and submit specified submittals in accordance with "Conditions of the Contract" and Division 1 Submittals Sections. Product data, shop drawings, samples, and similar submittals are defined in "Conditions of the Contract."

B. Quality Assurance/Control Submittals:
   1. Test Reports: Submit certified test reports showing compliance with specified performance characteristics.

### 1.04 WARRANTY

A. Project Warranty: Refer to "Conditions of the Contract" for project warranty provisions.

B. Manufacturer's Product Warranty: Submit, for Owner's acceptance, manufacturer's warranty for entrance system as follows:
   1. Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty shall begin in no event later than six months from date of shipment by Kawneer. In addition, welded door corner construction shall be supported with a limited lifetime warranty for the life of the door under normal use.
   2. The Warranties submitted under this Section shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and the laws of governing jurisdictions and is in addition to and runs concurrently with other warranties made by the Contractor under requirements of the Contract Documents.

### 1.05 QUALITY ASSURANCE

A. Qualifications:
   1. Installer Qualifications: Installer experienced (as determined by contractor) to perform work of this section who has specialized in the installation of work similar to

that required for this project and who is acceptable to product manufacturer.

2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction, approving acceptable installer and approving application method.

B. Pre-Installation Meetings: Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

### 1.06 DELIVERY, STORAGE, AND HANDLING

A. Ordering: Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

B. Packing, Shipping, Handling, and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle entrance doors and components to avoid damage. Protect entrance doors against damage from elements, construction activities, and other hazards before, during and after entrance installation.

## PART 2 – PRODUCTS

### 2.01 MANUFACTURERS (ACCEPTABLE MANUFACTURERS/PRODUCTS)

A. Products and accessories specified are manufactured by the Kawneer Company and establish a standard of quality for products of this section.

B. Equivalent product by the following manufacturers are acceptable:

1. Vistawall Architectural Products.
2. YKK AP America , Inc.
3. Old Castle Inc.

Substitutions permitted under provisions of Section 01600.

### 2.02 MATERIALS

A. Aluminum (Entrances and Components):
1. Material Standard: ASTM B 221; 6063-T5 alloy and temper
2. The door shall be 2" thick and stile and rail face dimensions of:

| Door | Vertical Stile | Top Rail | High Bottom Rail |
|---|---|---|---|
| STANDARD | 5" | 5" | 10-1/4" |

3. Glass stops shall be square.
4. All walls of the door members shall be a minimum 0.188" nominal in thickness with 0.050" thick glass stops.
5. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of entrance members are nominal and in compliance with Aluminum Standards and Data, published by The Aluminum Association.

B. Glazing gaskets shall be either EPDM elastomeric extrusions or a thermoplastic elastomer.

C. Provide adjustable glass jacks to help center the glass in the door opening.

D. Door Hardware:
1. Hinge: Manufacturers standard, continuous.
2. Closers:

a. Overhead concealed, single acting, adjustable closing and latching speed and backcheck, non hold open.

b. Adjustable opening force and delayed closing in accordance with applicable accessibility code.

3. Exit Devices:
   a. UL 305 and ANSI/BHMA A156.3, Grade 1, push pad design.
   b. Single Door: Rim type
   c. Paired doors: Concealed vertical type rod type.
   d. Outside Trim: To be selected from manufacturers full range of selection.
   e. Cylinders: To be determined-standard .
4. Push and Pull sets: To be selected from manufactures full range of selections
5. Thresholds: 4 inches wide x 1/2" high, aluminum, saddle profile.
6. Door stops: Floor mounted, aluminum riser with resilient bumper.

**2.03 ACCESSORIES**

A. Fasteners: Where exposed, shall be aluminum, stainless steel or plated steel.

B. Perimeter Anchors: Aluminum. When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

C. Standard Entrance Hardware
   1. Weatherstripping:
      a. Meeting stiles on pairs of doors shall be double weathered with one consisting of an adjustable astragal.
      b. The door weathering on a single acting offset pivot or butt hung door and frame (single or pairs) shall be Kawneer Sealair® weathering. This is comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.
   2. Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners. (Necessary to meet specified performance tests.)
   3. Balance of Hardware specified in Section 08710 – Door Hardware. The finish hardware supplier shall be responsible for furnishing physical hardware to the entrance manufacturer prior to fabrication, and for coordinating hardware delivery requirements with the hardware manufacturer, the general contractor and the entrance manufacturer to insure the building project is not delayed.

**2.04 RELATED MATERIALS**

A. Sealants: Refer to Joint Treatment (Sealants) Section.

B. Glass: Refer to Glass and Glazing Section.

**2.05 FABRICATION**

A. Entrance System Fabrication:
   1. Door corner construction shall consist of mechanical clip fastening, SIGMA deep penetration plug welds and 1-1/8" long fillet welds inside and outside of all four corners. Glazing stops shall be hook-in type with EPDM glazing gaskets reinforced with non-stretchable cord.
   2. Accurately fit and secure joints and corners. Make joints hairline in appearance.
   3. Prepare components with internal reinforcement for door hardware.
   4. Arrange fasteners and attachments to conceal from view.
   5. Door frame moldings 4-1/2" in depth, which provide structural support for the door(s), shall be full tubular sections with minimum wall thicknesses – specify or 3/16" – at exposed faces and sides, 5/16" at recessed sidewalls receiving mortised or concealed hardware.

### 2.06 FINISHES

A. Factory Finishing:
   1. dark bronze anodized aluminum

### 2.07 SOURCE QUALITY CONTROL

A. Source Quality: Provide aluminum entrances specified herein from a single source.
   1. Building Enclosure System: When aluminum entrances are part of a building enclosure system, including storefront framing, windows, curtain wall system and related products, provide building enclosure system products from a single source manufacturer.

B. Fabrication Tolerances: Fabricate aluminum entrances in accordance with entrance manufacturer's prescribed tolerances.

## PART 3 – EXECUTION

### 3.01 EXAMINATION

A. Site Verification of Conditions: Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions. Verify openings are sized to receive storefront system and sill plate is level in accordance with manufacturer's acceptable tolerances.
   1. Field Measurements: Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

### 3.02 INSTALLATION

A. General: Install entrance system in accordance with manufacturer's instructions and AAMA storefront and entrance guide specifications manual.
   1. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
   2. Provide alignment attachments and shims to permanently fasten system to building structure.
   3. Align assembly plumb and level, free of warp and twist. Maintain assembly dimensional tolerances aligning with adjacent work.
   4. Set thresholds in bed of mastic and secure.
   5. Adjusting: Adjust operating hardware for smooth operation.

B. Related Products Installation Requirements:
   1. Sealants (Perimeter): Refer to Section 7 Joint Treatment (Sealants).
   2. Glass: Refer to Section 8 Glass and Glazing.
   a. Reference: ANSI Z97.1, CPSC 16 CFR 1201 and GANA Glazing Manual.

### 3.03 PROTECTION AND CLEANING

A. Cleaning: Remove temporary coverings and protection of adjacent work areas. Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

B. Protection: Protect installed product's finish surfaces from damage during construction. Protect aluminum entrances from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants. Remove and replace damaged aluminum entrances at no extra cost.

**END OF SECTION**

# SECTION 08710

# HARDWARE SCHEDULE

## PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Provide all items of finish hardware required to adequately trim, hang, and operate all doors, as is hereinafter specified and listed in the Hardware Schedule.
   1. Provide hardware for doors and frames of unusual profile or shape or other special conditions.
   2. Provide all necessary standard and special fasteners, screws, bolts, expansion shields or anchors to properly secure hardware to its intended door, frame, or other surface.

B. Related Sections include the following:
   1. Steel Doors and Frames:
   2. Interior Aluminum Frames:
   3. Flush Wood Doors:
   4. Aluminum Storefront:
   5. Access Control System:

1.2 REFERENCES

A. The following reference standards and model code documents shall be used in estimating and detailing door hardware, and shall considered as a standard of quality, function, and performance, as applicable:
   1. I.B.C. International Building Code 2009 Edition.
   2. NFPA-80 Fire Doors & Windows (current year adopted).
   3. NFPA-101 Life Safety Code (current year adopted).
   4. NFPA-105 Smoke Control Door Assembly. (current year adopted)
   5. ANSI-117.1 1992 Edition Providing Accessibility and Usability for Physically Handicapped People.
   6. A.D.A.A.G Americans with Disabilities Act Accessibility Guidelines.
   7. T.A.S. Texas Accessibility Standards.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Section 013300.

B. Product Data: Provide a catalog cut sheet, clearly marked and identified, illustrating and describing each product included in the Hardware Schedule.
   1. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
   2. Formulate catalog cut sheets into sets and include a set with each copy of the Hardware Schedule submitted.

C. Door Hardware Schedule: Prepared by or under the supervision of Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
   1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
   2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening.
   3. Content: Include the following information:
      a. Type, style, function, size, label, hand, and finish of each door hardware item.
      b. Complete designations of every item required for each door or opening including name and manufacturer.

c. Fastenings and other pertinent information.
d. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule. Use same scheduling sequence and format and use same door numbers and hardware set numbers as in the Contract Documents.
e. Explanation of abbreviations, symbols, and codes contained in schedule.
f. Mounting locations for door hardware.
g. Door and frame sizes and materials.
h. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.

4. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other Work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.

D. Wiring Diagrams: For electrified hardware items specified for this Project, Provide complete wiring diagrams along with riser drawings and elevations, showing locations where such material is to be installed. Wiring Diagrams shall be submitted with Hardware Schedule. Verify and coordinate with the electrical systems installer. Integration shall take effect into central system as specified by Owner.
1. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.
2. Sequence of Operation: Include description of component functions that occur in the following situations:
a. authorized person wants to enter;
b. authorized person wants to exit;
c. unauthorized person wants to enter;
d. unauthorized person wants to exit.

E. Samples for Verification: If so requested by the Architect, provide a sample of any product or item requested, properly marked and tagged, for the opening for which it is intended.

F. Keying: Provide a keying schedule, listing the levels of keying, (GGMK, GKD, MKD or KA) as well as an explanation of the key system's function, the key symbols used and the numbers of the doors controlled. Provide in conjunction with the Door Index/Keying Schedule (which lists the door number, schedule heading, lock type and individual key symbol and remarks or special instructions) mentioned in above. Project shall be Masterkeyed and/or Grand Masterkeyed and provide two (2) keys per lockset or cylinder.

G. Operation and Maintenance Data: For each type of door hardware to include in maintenance manuals. Provide latest, revised and updated schedule of finish hardware, complete with catalog cuts and keying schedule. In addition, furnish one (1) copy of maintenance and parts manuals for those items for which they are readily available and normally provided.
1. Submit in accordance with provisions of Section 01782.

1.4 QUALITY ASSURANCE

A. Substitutions: Request for substitutions for alternative hardware items will not be accepted on this Project unless specifically indicated. Specification indicates one (1) specified product, listed hereinafter in the Hardware Schedule, and two (2) acceptable alternative manufacturers for that product. If any specified product is listed as a "No Substitution" product, only that specified product shall be provided as indicated.

B. Installer Qualifications: An experienced installer who has completed 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.

C. Supplier Qualifications: Door hardware supplier with warehousing facilities in Project's vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
1. The hardware supplier shall be engaged regularly in the furnishing, delivery and servicing of contract builder's hardware and must be experienced and knowledgeable in all phases of estimating, detailing, scheduling, masterkeying, shipping and installation practices.
2. When electro-mechanical or electronic hardware is supplied, a qualified individual with a

minimum five- (5) year's experience shall be available for assistance.

D. Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.

E. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.

F. Regulatory Requirements: Comply with provisions of the following:
   1. Provide hardware that complies with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," and ANSI A117.1.

G. Fire-Rated Door Assemblies: Provide door hardware for 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 NFPA 252.

H. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

I. Keying Conference: Conduct conference at Project site to comply with requirements in Division 1 Section "Project Meetings." Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
   1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
   2. Preliminary key system schematic diagram.
   3. Requirements for key control system.
   4. Address for delivery of keys.
   5. Location of Key Cabinet.

## 1.5 DELIVERY, STORAGE, AND HANDLING

A. Marking and Packaging: All items of hardware shall be delivered to the site in manufacturer's original cartons or boxes. Each item of hardware shall be marked with the abbreviation set forth on the Shop Drawings to ensure that the product reaches its installation destination without needing specific hardware product number knowledge.

B. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

C. 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.

## 1.6 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

B. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, security system, and building control system, as applicable.

## 1.7 MAINTENANCE

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.

B. Maintenance Service: If there are any products listed hereinafter that normally require a maintenance or service contract, provide the Owner and Architect with details and costs of standard maintenance or service contract.

**PART 2 - PRODUCTS**

2.1 MANUFACTURERS

A. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Hardware Schedule" Article. Products are identified by using 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 Part 3 "Hardware Schedule" Article.

B. Product manufacturers listed with an asterisk (*) denote the specified manufacturers listed in the Hardware Schedule. The remaining two (2) listed manufacturers will be acceptable substitutions. If only one manufacturer is listed this shall be considered a “No Substitution” specification as set forth in “Quality Assurance” Article, for that particular item.

2.2 MATERIALS

A. Screws and Fasteners: Provide all screws and fasteners of the proper size and type to properly anchor or attach the item of hardware scheduled. Provide all fasteners with Phillips heads, unless security type screws (spanner-head or torx-head) are hereinafter specified.

B. Hinges: Provide as follows:
   1. On doors to exterior openings and main corridor doors, and other doors of high frequency use, provide a continuous, gear type hinge of appropriate weight.
   2. Where regular ball bearing hinges are listed for other doors, provide one hinge for each 30-inch of door height.
   3. The width of the hinges shall be sufficient to clear all trim that is mounted to the doorframe.
   4. Acceptable Manufacturers:
      a. Ives*
      b. Hager.
      c. Bommer.

C. Continuous Hinges: Continuous hinges shall consist of three (3)-interlocking extrusions in a pin-less assembly applied to the full height of the door. All continuous geared hinges shall be manufactured to template screw locations and be non-handed. All mortise hinges and half mortise hinges shall cover and wrap the door edge completely. Doorframe heads shall be extended for clearance on full or half mortise hinges versus downsizing doors for ease of repair and replacement. All frames shall be properly reinforced per manufacturer's standards.
   1. Standard warranty shall be for the life of opening.
   2. Acceptable Manufacturers:
      a. Ives*
      b. Select.
      c. Pemko.

D. Locks: All locks shall incorporate a seven pin removable core tumbler system and be keyed to a GRANDMASTER SYSTEM as not to breach security of system in place. Keying system must be guaranteed of no duplication of existing change keys, master keys or grandmaster keys located in this Project. All keying shall be coordinated with Owner. Locks shall be Grade 1 mortise and as hereinafter listed in the Hardware Schedule.
   1. Acceptable Manufacturers:
      a. Schlage* (no substitution)
      b. Keying – Schlage FSIC Primus.

E. Lock Trim: Mortise locks are to be furnished with lever handle trim, with levers having a return to within 1/2 inch of the door face, as is hereinafter listed in the Hardware Schedule.

F. Flush Bolts: Manual flush bolts to have 12-inch rods for doors 7’-6”. Doors over 7’-6” high shall have bolts with top rods of 18 inch or 24 inch to allow ease of access to bolt lever. Furnish dust proof strikes for all bottom bolts.
   1. Acceptable Manufacturers:
      a. Ives*
      b. Trimco.

c. Rockwood.

G. Power Supply: Power supply shall integrate with selected switching for maintained switching with an emergency interface relay wired into the fire alarm system to insure fail secure application. Battery backup shall be included to produce backup power at full load during power failure.
1. Acceptable Manufacturers:
a. Schlage Commercial Electronics*
b. (no substitution)

H. Exit Devices: Exit Devices shall be rim, mortise or vertical rod type as called for in the Hardware Schedule. Devices shall be of the touch-pad type as is hereinafter specified in the Hardware Schedule. Exit devices shall be constructed to allow cylinder to be removed and re-keyed without removing the device from the door either by removable core cylinders or construction of exit device. Exit devices shall be constructed to allow the conversion from one function to another simply within lock stile case and selecting proper outside trim as specified hereinafter in the Hardware Schedule. Devices shall be furnished with outside trim lever handles matching locks.
1. Acceptable Manufacturers:
a. Von Duprin*
b. (no substitution)

I. Exit Device (QEL): Electric latch retraction, exit devices shall provide remote unlocking ability. A control switch or wiring schematic as specified shall allow an “exit” only or latched door to push-pull operation by a continuous duty solenoid retracting the latch bolt.
1. Acceptable Manufacturers:
a. Von Duprin*
b. (no substitution)

J. Card Reader/Controller: Access credential reader shall be capable of reading keypad codes to insure flexibility of control and management.
1. Acceptable Manufacturers:
a. Related Section*

K. Door Closers: Door closers shall be of cast iron and rectangular design, furnished with a full cover. Provide complete with backcheck, delayed action and hold-open as indicated. Closers shall be mounted out of the line of sight wherever possible (i.e., room side of corridor doors, etc.) with parallel arm mounting on out-swinging doors. Mount closers to jamb or on brackets and/or drop plates, where special conditions require.
1. Acceptable Manufacturers:
a. LCN*
b. (no substitution)

L. Push Plates: Push plates are to be .050 brass, bronze or stainless steel with four (4) beveled edges, drilled and countersunk for screws, as is hereinafter specified in the Hardware Schedule.
1. Acceptable Manufacturers:
a. Ives*
b. Trimco.
c. Rockwood.

M. Door Pulls: Door pulls shall be ADA compliant with a 2 1/2 inch projection from back of pull to face of door. All door pulls shall be thru-bolted or back-to-back mounted.
1. Acceptable Manufacturers:
a. Ives*
b. Trimco.
c. Rockwood.

N. Protective Plates: Protective plates shall be mop (6”), kick (10”) or armor (34”) and shall be minimum .050 thick brass, bronze, or stainless steel, with three (3) beveled edges, drilled and countersunk for screws. Plates shall be mounted to avoid louvers and/or glass kits.
1. Acceptable Manufacturers:
a. Ives*
b. Trimco.
c. Rockwood.

O. Door Stops and Holders: Where a door strikes a wall at approximately 90 degrees, a suitable door stop shall be provided, either a wall bumper or floor stop. Where doors are undercut, provide floor stops with adequate height to properly stop the door. If door would not otherwise

strike a wall, an overhead stop shall be provided. In-wall blocking for wall bumpers at stud walls shall be provided in accordance with Section 06105. Provide reinforcing in frame and door for overhead stops.

1. Acceptable Manufacturers:
   a. Ives*
   b. Trimco.
   c. Rockwood.
   d. Glynn-Johnson*.

P. Thresholds and Weatherstrip: Weatherstripping to have aluminum housing, specified insert, and elongated mounting holes. Door sweeps shall be surface mounted, of aluminum/stainless steel housing with specified insert. Overhead drip caps to be of aluminum, have a 2 1/2-inch projection and be 4 inches wider than the door opening. Thresholds shall be of saddle type with no more than 1/2 inch rise. Weatherstripping and smoke seals shall be surface-mounted on doorstop and have 1/4" adjustment slots.

1. Acceptable Manufacturers:
   a. NGP*
   b. Hager.
   c. Pemko.

Q. Smoke Gasket: Smoke gasket shall comply with door and frame manufacturers for positive pressure tests for fire and smoke. (UBC 7-2, Parts 1 & 2/UL10C).

1. Acceptable Manufacturers:
   a. NGP*
   b. Hager.
   c. Pemko.

2.3 FINISHES

A. Hardware finishes shall match and be maintained to BHMA symbols, as indicated in the Hardware Schedule. Strict adherence to base metals and finish is required.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

2. 4 KEYING

A. Keying of locks and cylinders throughout project shall be scheduled through a key meeting with Architect, Owner, and hardware supplier. Key schedule shall be prepared and submitted to the Owner for approval. Copies of final key schedule with the bitting instructions shall be submitted as part of the Project Record Documents.

2.5 KEY CONTROL

A. Provide key cabinet(s) manufactured by of sufficient capacity to handle all keys, plus 50 percent expansion. Provide key control cross-reference chart and accountability (sign-out) tags.

1. Acceptable Manufacturers:
   a. Telkee*
   b. Lund.
   c. Key Control Systems.

**PART 3 - EXECUTION**

3.1 EXAMINATION

A. Examine doors and frames, 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. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

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

## 3.2 PREPARATION

A. Steel Doors and Frames: Comply with DHI A115 series.
   1. Surface-Applied Door Hardware: Drill and tap doors and frames according to SDI 107 or ANSI A250.6, whichever is more stringent.

B. Wood Doors: Comply with DHI A115-W series.

## 3.3 INSTALLATION

A. Installation shall be by a qualified installer with a minimum five (5) year's experience in the installation of commercial grade hardware. Manufacturer's instructions shall dictate templating and installation.

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."

C. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 9 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
   1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
   2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

D. Key Control System: Place keys on markers and hooks in key control system cabinet, as determined by final keying schedule.

E. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect prior to installation.

F. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 7 Section "Joint Sealants."

## 3.4 FIELD QUALITY CONTROL

A. Perform final inspection with hardware installer and hardware supplier present to ensure correct installation and operation, and check for any damaged or defective items. Observe and inspect that all hardware has been installed to its correct destination in proper working order.

B. Independent Architectural Hardware Consultant: Owner reserves the right to engage a qualified independent Architectural Hardware Consultant to perform a separate independent inspection and to prepare an inspection report.

## 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.
   1. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
   2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
   3. Door Closers: Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

B. At completion of the installation and prior to Substantial Completion, make final adjustments to door closures and other items of hardware. Leave all hardware clean and fully operable. Should any item be found to be defective, it shall be repaired or replaced as directed.

C. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.6 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items as necessary to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.7 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Section 01820.

**END OF SECTION**

# SECTION 08800

# GLAZING

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Glass and glazing materials for windows, and doors.

B. Glazing compounds and accessories.

### 1.02 RELATED SECTIONS

A. Section 07900 - Joint Sealers: Sealant and back-up material.

B. Section 08410 – Aluminum Storefronts.

C. Section 08411 – Aluminum Entrances

### 1.03 REFERENCES

A. ASTM C 1036 - Standard Specification for Flat Glass; 1991 (Reapproved 1997).

B. ASTM C 1048 - Standard Specification for Heat-Treated Flat Glass--Kind HS, Kind FT Coated and Uncoated Glass; 1997b.

C. ASTM C 1193 - Standard Guide for Use of Joint Sealants; 2000.

D. ASTM E 1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2000.

E. GANA (GM) - GANA Glazing Manual; Glass Association of North America; 1997.

F. GANA (SM) - FGMA Sealant Manual; Glass Association of North America; 1990.

### 1.04 PERFORMANCE REQUIREMENTS

A. Provide glass and glazing materials for continuity of building enclosure vapor retarder and air barrier:
   1. In conjunction with materials described in Section 07900 and 08520.
   2. To utilize the inner pane of multiple pane sealed units for the continuity of the air barrier and vapor retarder seal.
   3. To maintain a continuous air barrier and vapor retarder throughout the glazed assembly from glass pane to heel bead of glazing sealant.

B. Select type and thickness of exterior glass to withstand dead loads and wind loads acting normal to plane of glass at design pressures calculated in accordance with applicable code.
   1. Use the procedure specified in ASTM E 1300 to determine glass type and thickness.
   2. Limit glass deflection to 1/200 or flexure limit of glass, whichever is less, with full recovery of glazing materials.
   3. Thicknesses listed are minimum.

### 1.05 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data on Glass Types: Provide structural, physical and environmental characteristics, size limitations, and special handling or installation requirements.

C. Product Data on Glazing Compounds: Provide chemical, functional, and environmental characteristics, limitations, special application requirements. Identify available colors.

D. Samples of each glass type indicating color and tint properties.

E. Manufacturer's Certificate: Certify that glass meets or exceeds specified requirements.

### 1.06 QUALITY ASSURANCE

A. Perform Work in accordance with GANA Glazing Manual and FGMA Sealant Manual for glazing installation methods.

B. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience.

### 1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not install glazing when ambient temperature is less than 50 degrees F.

B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

### 1.08 WARRANTY

A. See Section 01780 - Closeout Submittals, for additional warranty requirements.

B. Provide a five (5) year warranty to include coverage for sealed glass units from seal failure, interpane dusting or misting, and replacement of same.

C. Provide a five (5) year warranty to include coverage for delamination of laminated glass and replacement of same.

D. The Warranties submitted under this Section shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and the laws of governing jurisdictions and is in addition to and runs concurrently with other warranties made by the Contractor under requirements of the Contract Documents.

## PART 2 PRODUCTS

### 2.01 FLAT GLASS MATERIALS

A. Manufacturers:
   1. AFG Industries, Inc: www.afgglass.com.
   2. Guardian Industries Corp: www.guardian.com.
   3. Pilkington Building Products North America: http://buildingproducts.us.pilkington.com.
   4. PPG Industries, Inc: www.ppg.com.
   5. Viracon: www.viracon.com.
   6. Substitutions: Permitted under provisions of Section 01600 - Product Requirements.

B. Glass Tint: Where glass is indicated as tinted, match tint of existing Family Life Center Building.

C. Clear Float Glass: Clear, annealed.
   1. Comply with ASTM C 1036, Type I, transparent flat, Class 1 clear, Quality q3 glazing select.

D. Safety Glass: Clear; fully tempered with horizontal tempering.
   1. Comply with ASTM C 1048, Condition A uncoated, Type I, transparent flat, Class 1, Quality q3 glazing select.

E. Tinted Glass: Float type, annealed, heat-absorbing and light reducing in tinted color.
   1. Comply with ASTM C 1048, Condition A uncoated, Type I, transparent flat, Class 2 tinted heat-absorbing and light reducing, Quality q3 glazing select.

F. Tinted Safety Glass: Float type, fully tempered, heat-absorbing and light reducing in tinted color.
   1. Comply with ASTM C 1048, Condition A uncoated, Type I, transparent flat, Class 2 tinted heat-absorbing and light reducing, Quality q3 glazing select.

## 2.02 SEALED INSULATING GLASS MATERIALS

A. Manufacturer:
   1. Viracon.
   2. Substitutions: Permitted under provisions of Section 01600 - Product Requirements.

B. Type 1 Insulated Safety Glass Units and Insulated Glass Units: Double pane with glass to elastomer edge seal
   1. Uses: Exterior vertical glazing. Provide safety glass where indicated on drawings.
   2. Acceptable Product: VE1/2M; manufactured by Viracon.
      a. Substitutions: Permitted under provisions of Section 01600 - Product Requirements.

C. Type 2 Insulated Safety Glass Units: Double pane with glass to elastomer edge seal.
   1. Uses: Skylight glazing.
   2. Acceptable Product: 1-1/8 inch VRE459 Insulated/Laminated; manufactured by Viracon.
      a. Substitutions: Permitted under provisions of Section 01600 - Product Requirements.

D. Type 3 Insulated Safety Glass Units: Double pane with glass to elastomer edge seal.
   1. Uses: Exterior vertical glazing at Sanctuary. (Stained glass)

## 2.03 GLAZING MATERIALS

A. Manufacturers:
   1. Norton Performance Plastics Corp.
   2. Pecora Corporation: www.pecora.com.
   3. Tremco, Inc: www.tremcosealants.com.
   4 PPG. Inc.
   5. Substitutions: Refer to Section 01600 - Product Requirements.

B. Provide types for applicable setting method specified in GANA Glazing Manual and FGMA Sealant Manual except as specified otherwise. Do not use metal sash putty, nonskinning compounds, nonresilient preformed sealers or impregnated preformed gaskets.

C. Materials Exposed to View and Unpainted: Black.

D. Accessories: As required for complete installation. Include glazing points, clips, shims, angles, beads, gaskets and spacers. Provide primer-sealers and cleaners as recommended by glass and sealant manufacturer.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Verify that openings for glazing are correctly sized and within tolerance.

B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and ready to receive glazing.

## 3.02 PREPARATION

A. Clean contact surfaces with solvent and wipe dry.

B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.

C. Prime surfaces scheduled to receive sealant.

D. Install sealants in accordance with ASTM C 1193 and FGMA Sealant Manual.

E. Install sealant in accordance with manufacturer's instructions.

**3.03 INSTALLATION**

A. Install glass in accordance with recommendations and procedures in GANA Glazing Manual and FGMA Sealant Manual.

B. Install glass in accordance with storefront frame manufacturer recommendations and instructions.

C. Install glass with lines or waves horizontal.

**3.04 CLEANING**

A. Remove glazing materials from finish surfaces.

B. Remove labels after Work is complete.

C. Clean glass and adjacent surfaces.

**3.05 PROTECTION OF FINISHED WORK**

A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

**END OF SECTION**

# SECTION 09260

# GYPSUM BOARD ASSEMBLIES

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Metal stud wall framing.

B. Metal channel ceiling framing.

C. Acoustic insulation.

D. Gypsum wallboard.

E. Joint treatment and accessories.

F. Textured finish system.

### 1.02 RELATED SECTIONS

A. Section 06100 – Rough Carpentry: Wood blocking for support of wall-mounted equipment.

### 1.03 REFERENCES

A. AISI SG-971 - Specification for the Design of Cold-Formed Steel Structural Members; 1996, with 2000 Supplement.

B. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units; 1999.

C. ANSI A118.9 - American National Standard Specifications for Cementitious Backer Units; 1999.

D. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2002a.

E. ASTM C 36/C 36M - Standard Specification for Gypsum Wallboard; 2001.

F. ASTM C 79/C 79M - Standard Specification for Treated Core and Nontreated Core Gypsum Sheathing Board; 2001.

G. ASTM C 475/C 475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2002.

H. ASTM C 514 - Standard Specification for Nails for the Application of Gypsum Board; 2001.

I. ASTM C 645 - Standard Specification for Nonstructural Steel Framing Members; 2000.

J. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2001.

K. ASTM C 754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2000.

L. ASTM C 840 - Standard Specification for Application and Finishing of Gypsum Board; 2002.

M. ASTM C 931/C 931M - Standard Specification for Exterior Gypsum Soffit Board; 1998.

N. ASTM C 954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2000.

O. ASTM C 1002 - Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2001.

P. ASTM C 1047 - Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base; 1999.

Q. ASTM C 1396/C 1396M - Standard Specification for Gypsum Board; 2002.

R. ASTM D 226 - Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing; 1997a.

S. GA-253 - Recommended Specifications for the Application of Gypsum Sheathing; Gypsum Association; 1999.

T. GA-600 - Fire Resistance Design Manual; Gypsum Association; 2000.

### 1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate special details associated with fireproofing and acoustic seals.

C. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.

D. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

### 1.05 QUALITY ASSURANCE

A. Perform in accordance with ASTM C 840. Comply with requirements of GA-600 for fire-rated assemblies.

B. Applicator Qualifications: Company specializing in performing gypsum board application and finishing, with minimum five years of documented experience.

### 1.06 REGULATORY REQUIREMENTS

A. Conform to applicable code for fire rated assemblies as follows:

## PART 2 PRODUCTS

### 2.01 METAL FRAMING MATERIALS

A. Metal Framing Manufacturers:
   1. Clark Steel Framing Systems: www.clarksteel.com.
   2. Dale/Incor: www.daleincor.com.
   3. Dietrich Metal Framing, Inc: www.dietrichindustries.com.
   4. Marino-Ware: www.marinoware.com.
   5. Substitutions: See Section 01600 - Product Requirements.

B. Metal Framing Connectors and Accessories:
   1. Same manufacturer as framing.

C. Non-Loadbearing Framing System Components: ASTM C 645; galvanized sheet steel, of size and properties necessary to comply with ASTM C 754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
   1. Studs: C shaped with knurled faces.
   2. Runners: U shaped, sized to match studs.
   3. Ceiling Channels: C shaped.
   4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.

D. Loadbearing Studs for Application of Gypsum Board: As specified in Section 05400.

E. Ceiling Hangers: Type and size as specified in ASTM C 754 for spacing required.

F. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
   1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI SG-971 Specification for the Design of Cold-Formed Steel Structural Members.
   2. Material: ASTM A 653/A 653M steel sheet, SS Grade 50, with G60/Z180 hot dipped galvanized coating.

G. Between stud wall blocking: Type and size appropriate to stud spacing.

**2.02 GYPSUM BOARD MATERIALS**

A. Manufacturers:
   1. G-P Gypsum Corporation: www.gp.com.
   2. National Gypsum Company: www.nationalgypsum.com.
   3. USG Corporation: www.usg.com.
   4. Substitutions: See Section 01600 - Product Requirements.

B. Gypsum Wallboard: ASTM C 36/C 36M and ASTM C 1396/C 1396M. Sizes to minimize joints in place; ends square cut.
   1. Interior Type X: Fire resistant, UL or WH rated.
      a. Application: Where required for fire-rated assemblies, unless otherwise indicated.
      b. Thickness: 5/8”
      c. Edges: Tapered.

   2. Impact-Resistant Type: Gypsum wallboard especially formulated for increased impact resistance, with enhanced gypsum core and heavy duty face and fiber reinforced.
      a. Application: High-traffic areas indicated.
      b. Core Type: 5/8”Type X.

   3. Moisture & Mold Resistant: : Gypsum wallboard especially formulated for plumbing wall locations.
      a. Application: All Restrooms and Kitchen
      b. Core Type: 5/8 Type X.

C. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, ASTM C 931/C 931M, or ASTM C 1396/C 1396M, with manufacturer's standard edges.

   1. Product: Subject to compliance with requirements, provide "Dens-Glass Gold" by G-P Gypsum.
   2. Core: As indicated, **Type X where designated on Construction Drawings**
   3. Long Edges: Square.

B.

D. Shaft Wall liner: ASTM C1396; 1" inch thick x 24" wide, maximum practical length, square edges.

**2.03 ACCESSORIES**

A. Acoustic Insulation: ASTM C 665; preformed glass fiber, friction fit type, unfaced. Thickness indicated on drawings.

B. Acoustic Sealant: Non-hardening, non-skinning, for use in conjunction with gypsum board. Provide Bostik Fireban One manufactured by Bostik Findley, or approved equal.

C. Building Paper: Asphalt impregnated building felt conforming to ASTM D 226, Type I.

D. Finishing Accessories: ASTM C 1047, galvanized steel or rolled zinc, unless otherwise indicated.
   1. Types: As detailed or required for finished appearance.
   2. Special Shapes: In addition to conventional cornerbead and control joints, provide U-bead at exposed panel edges.
      a. Substitutions permitted under provisions of Section 01600.
   4. Outside Corners: Provide chamfer with chamfer adapter as indicated on drawings and as manufactured by Trimtex.
      a. Substitutions permitted under provisions of Section 01600.

E. Joint Materials: ASTM C 475 and as recommended by gypsum board manufacturer for project conditions.
   1. Tape: 2 inch wide, creased paper tape for joints and corners.
   2. Ready-mixed vinyl-based joint compound.

F. Textured Finish Materials: Latex-based compound; plain.

G. Screws: ASTM C 1002; self-piercing tapping type.

H. Screws: ASTM C 954; steel drill screws for application of gypsum board to loadbearing steel studs.

I. Nails: ASTM C 514.

J. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that project conditions are appropriate for work of this section to commence.

### 3.02 FRAMING INSTALLATION

A. Metal Framing: Comply with ASTM C 754 and manufacturer's instructions.

B. Suspended Ceilings: Space framing and furring members as indicated.
   1. Level ceiling system to a tolerance of 1/1200.
   2. Laterally brace entire suspension system.

C. Studs: Space studs as scheduled.
   1. Extend partition framing to structure where indicated. Extend to minimum 8 inches above lay-in ceiling plane where not scheduled to extend to deck.
   2. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.

D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

E. Standard Wall Furring: Install at concrete and masonry walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 16 inches on center.
   1. Orientation: Horizontal.

2. Spacing: As indicated.

F. Furring for Fire Ratings: Install as required for fire resistance ratings indicated and to GA-600 requirements.

G. Blocking: Install blocking for support of plumbing fixtures, toilet partitions, toilet accessories, and hardware.

### 3.03 ACOUSTIC ACCESSORIES INSTALLATION

A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.

B. Acoustic Sealant: Install in accordance with manufacturer's instructions.
1. Place one bead continuously on substrate before installation of perimeter framing members.
2. Place continuous bead at perimeter of each layer of gypsum board.
3. In non-fire-rated construction, seal around all penetrations by conduit, pipe, ducts, and rough-in boxes.

### 3.04 GYPSUM BOARD INSTALLATION

A. Comply with ASTM C 840 and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.

B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.

C. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of listing authority.

### 3.05 INSTALLATION OF TRIM AND ACCESSORIES

A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
2. Place vertical control joints at above each side at hollow metal doors frame locations.

B. Corner Beads: Install at external corners, using longest practical lengths.

C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials and as indicated.

### 3.06 JOINT TREATMENT

A. Paper Faced Gypsum Board: Use paper joint tape, bedded with ready-mixed vinyl-based joint compound and finished with ready-mixed vinyl-based joint compound.

B. Finish all gypsum board in accordance with ASTM C 840 Level 4.

C. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
1. Feather coats of joint compound so that camber is maximum 1/32 inch.
2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.

### 3.07 TEXTURE FINISH

A. Apply finish texture coating by means required to match Architect's sample.

### 3.08 TOLERANCES

A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

**END OF SECTION**

# SECTION 09300

# TILE

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Tile for floor applications.

B. Tile for wall applications.

C. Cementitious backer board as tile substrate.

D. Stone thresholds.

### 1.02 RELATED SECTIONS

A. Section 07900 - Joint Sealers.

B. Section 09260 - Gypsum Board Assemblies: Installation of tile backer board.

### 1.03 REFERENCES

A. ANSI A108 Series/A118 Series/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium); 1999.
   1. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 1999.
   2. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar; 1999.
   3. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex Portland Cement Mortar; 1999.
   4. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile Setting Epoxy Adhesive; 1999.
   5. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar; 1999.
   6. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy; 1999.
   7. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Mortar and Grout; 1999.
   8. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 1999.
   9. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 1999.
   10. ANSI A108.11 - American National Standard for Interior Installation of Cementitious Backer Units; 1999.
   11. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 1999.
   12. ANSI A118.1 - American National Standard Specifications for Dry-Set Portland Cement Mortar; 1999.
   13. ANSI A118.4 - American National Standard Specifications for Latex-Portland Cement Mortar; 1999.
   14. ANSI A118.7 - American National Standard Specifications for Polymer Modified Cement Grouts for Tile Installation; 1999.
   15. ANSI A118.9 - American National Standard Specifications for Cementitious Backer Units; 1999.
   16. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 1988.

B. TCA (HB) - Handbook for Ceramic Tile Installation; Tile Council of America, Inc.; 2004.

**1.04 SUBMITTALS**

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.

C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.

D. Maintenance Data: Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

**1.05 QUALITY ASSURANCE**

A. Maintain one copy of TCA Handbook and ANSI A108 Series/A118 Series on site.

B. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum 5 years of documented experience.

C. Installer Qualifications: Company specializing in performing tile installation, with minimum of 5 years of documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

**1.07 ENVIRONMENTAL REQUIREMENTS**

A. Do not install adhesives in an unventilated environment.

B. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

**1.08 EXTRA MATERIALS**

A. Provide 10 sq. ft of each size, color, and surface finish of tile specified.

**PART 2 PRODUCTS**

**2.01 TILE**

A. Floor & Wall Porcelain Tile: PCT

1. Manufacturer: Atlas Concorde, Path
2 Color: Silver Pearl
3. Size and Shape: 12” x 24 “
4. Running Bond

B. Floor & Wall Porcelain Tile: PCT-1

1. Manufacturer: Atlas Concorde, Path
2 Color: Silver Pearl
5. Size and Shape: 12” x 24 “ ( 48” wainscot with Schluter tile trim )
6. Running Bond

C. Wall Porcelain Tile: PCT-2

1. Manufacturer: Popceilanoco – Tin Tile Zinc Porcelain Wall Tile #681725
   The Tile Shop – Les Ehrenberg , 682-707-8691
2. Color: Zinc
3. Size and Shape: 17” x 17 “

**2.02 TRIM AND ACCESSORIES**

A. Tile Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
   1. Applications: Use in the following locations:
      a. Open Edges: Bullnose.
      b. Inside Corners: Jointed.
      c. Floor to Wall Joints: Cove base.
   2. Manufacturer: Same as for tile.

B. Thresholds: Marble, white, honed finish; 2 inches wide by full width of wall or frame opening; 1/2 inch thick thick; beveled to meet handicapped access requirements; without holes, cracks, or open seams.
   1. Applications: Provide at the following locations:
      a. At doorways where tile terminates.
      b. At open edges of floor tile where adjacent finish is a different height.

**2.03 MORTAR MATERIALS**

A. Manufacturers:
   1. W.R. Bonsal Co: www.bonsal.com.
   2. Bostik: www.bostik.com.
   3. Custom Building Products: www.custombuildingproducts.com.
   4. Substitutions: See Section 01600 - Product Requirements.

B. Mortar Bed Materials: Portland cement, sand, latex additive and water.

C. Mortar Bond Coat Materials:
   1. Dry-Set Portland Cement type: ANSI A118.1.
   2. Latex-Portland Cement type: ANSI A118.4.

**2.04 GROUT MATERIALS**

A. Manufacturers:
   1. W.R. Bonsal Co: www.bonsal.com.
   2. Bostik: www.bostik.com.
   3. Custom Building Products: www.custombuildingproducts.com.
   4. Substitutions: See Section 01600 - Product Requirements.

B. Standard Grout: Polymer modified cement grout, sanded or unsanded, as specified in ANSI A118.7.
   1. Color: As selected.

**2.05 ACCESSORY MATERIALS**

A. Cementitious Backer Board: Specified in Section 09260.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

A. Verify that sub-floor surfaces are smooth and flat within tolerances specified in Section 03300 and are ready to receive tile.

B. Verify that wall surfaces are smooth and flat within tolerances specified in Section 09260,

are dust-free, and are ready to receive tile.

C. Verify that sub-floor surfaces are dust-free, and free of substances which would impair bonding of setting materials to sub-floor surfaces.

D. Verify that required floor-mounted utilities are in correct location.

**3.02 PREPARATION**

A. Protect surrounding work from damage.

B. Vacuum clean surfaces and damp clean.

C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

D. Install cementitious backer board in accordance with ANSI A108.11 and board manufacturer's instructions. Tape joints and corners, cover with skim coat of dry-set mortar to a feather edge. Cementitious backer board specified in Section 09260.

E. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

**3.03 INSTALLATION - GENERAL**

A. Install tile and thresholds and grout in accordance with applicable requirements of ANSI A108.1 through A108.13, manufacturer's instructions, and TCA Handbook recommendations.

B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.

C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.

D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.

E. Form internal angles square and external angles bullnosed.

F. Install thresholds where indicated.

G. Sound tile after setting. Replace hollow sounding units.

H. Keep expansion joints free of adhesive or grout. Apply sealant to joints.

I. Allow tile to set for a minimum of 48 hours prior to grouting.

J. Grout tile joints. Use standard grout unless otherwise indicated.

K. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.

**3.04 INSTALLATION - FLOORS - THIN-SET METHODS**

A. Over interior concrete substrates, install in accordance with TCA Handbook Method F113, dry-set or latex-portland cement bond coat, with standard grout, unless otherwise indicated.
   1. Where waterproofing membrane is indicated, install in accordance with TCA Handbook Method F122, with latex-portland cement grout.

**3.05 INSTALLATION - WALL TILE**

A. Over cementitious backer units on studs, install in accordance with TCA Handbook Method W244, using membrane at toilet rooms.

B. Over interior concrete and masonry install in accordance with TCA Handbook Method W202, thin-set with dry-set or latex-portland cement bond coat.

### 3.07 CLEANING

A. Clean tile and grout surfaces.

### 3.08 PROTECTION OF FINISHED WORK

A. Do not permit traffic over finished floor surface for 4 days after installation.

**END OF SECTION**

# SECTION 09511

# SUSPENDED ACOUSTICAL CEILINGS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Suspended metal grid ceiling system.

B. Acoustical units.

C. Supplementary acoustical insulation above ceiling.

### 1.02 RELATED SECTIONS

A. Section 07900 - Joint Sealers: Acoustical sealant.

### 1.03 REFERENCES

A. ASTM C 635 - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2000.

B. ASTM C 636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels; 1996.

C. ASTM C 665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2001.

D. ASTM E 580 - Standard Practice for Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Seismic Restraint; 2002.

E. ASTM E 1264 - Standard Classification for Acoustical Ceiling Products; 1998.

### 1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate grid layout and related dimensioning.

C. Samples: Provide full size samples of proposed ceiling tiles. Provide 12 inch long sections of ceiling grid and trim.

D. Product Data: Provide data on suspension system components.

### 1.05 QUALITY ASSURANCE

A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

### 1.06 ENVIRONMENTAL REQUIREMENTS

A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

### 1.07 PROJECT CONDITIONS

A. Sequence work to ensure acoustical ceilings are not installed until building is enclosed, sufficient heat is provided, dust generating activities have terminated, and overhead work is completed, tested, and approved.

B. Install acoustical units after interior wet work is dry.

### 1.08 EXTRA MATERIALS

A. See Section 01600 - Product Requirements, for additional provisions.

B. Provide 5 percent of total acoustical unit area of each type of acoustical unit for Owner's use in maintenance of project.

## PART 2 PRODUCTS

### 2.01 ACOUSTICAL UNITS

A. Manufacturer: Products indicated in this section are manufactured by Armstrong World Industries and establish a standard of quality for products of this section. Substitutions permitted under provisions of Section 01600.

B. Acoustical Units - General: ASTM E 1264, Class A.

C. Acoustical Ceiling Tile, Type 1: ASTM E 1264 Type III, to the following characteristics:
   1. Size: 24 x 24 inches.
   2. Product: Fine Fissured; manufactured by Armstrong.
   3. Color: White.
   4. Edges: Tegular.

### 2.02 SUSPENSION SYSTEM(S)

A. Acceptable Product: 15/16 inch Exposed Tee Systems; manufactured by Armstrong World Industries.
   1. Color 1: White.
   .

B. Suspension Systems - General: ASTM C 635; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required.

### 2.03 ACCESSORIES

A. Support Channels and Hangers: Galvanized steel; size and type to suit application, seismic requirements, and ceiling system flatness requirement specified.

B. Perimeter Moldings: Same material and finish as grid.
   1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.

C. Gasket For Perimeter Moldings: Closed cell rubber sponge tape.

D. Touch-up Paint: Type and color to match acoustical and grid units.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify that layout of hangers will not interfere with other work.

### 3.02 INSTALLATION - SUSPENSION SYSTEM

A. Install suspension system in accordance with ASTM C 636, ASTM E 580, and manufacturer's instructions and as supplemented in this section.

B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.

C. Locate system on room axis according to reflected plan.

D. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.

E. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.

F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.

G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.

H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

I. Do not eccentrically load system or induce rotation of runners.

J. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
   1. Use longest practical lengths.
   2. Overlap and rivet corners.

### 3.03 INSTALLATION - ACOUSTICAL UNITS

A. Install acoustical units in accordance with manufacturer's instructions.

B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.

C. Fit border trim neatly against abutting surfaces.

D. Install units after above-ceiling work is complete.

E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.

F. Cutting Acoustical Units:
   1. Cut to fit irregular grid and perimeter edge trim.
   2. Make field cut edges of same profile as factory edges.
   3. Double cut and field paint exposed reveal edges.

G. Where round obstructions occur, provide preformed closures to match perimeter molding.

H. Install hold-down clips on each panel to retain panels tight to grid system; comply with fire rating requirements.

I. Install hold-down clips on panels within 20 ft of an exterior door.

### 3.04 ERECTION TOLERANCES

A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.

B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

**END OF SECTION**

# SECTION 09650

# RESILIENT FLOORING & BASE

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Resilient tile flooring.

B. Resilient base.

C. Installation accessories.

### 1.02 REFERENCES

A. ASTM F 710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2003.

B. ASTM F 1066 - Standard Specification for Vinyl Composition Floor Tile; 1999.

C. ASTM F 1861 - Standard Specification for Resilient Wall Base; 2002.

### 1.03 DELIVERY, STORAGE, AND PROTECTION

A. Protect roll materials from damage by storing on end.

### 1.04 ENVIRONMENTAL REQUIREMENTS

A. Maintain temperature in storage area between 55 degrees F and 90 degrees F.

B. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

### 1.05 EXTRA MATERIALS

A. See Section 01600 - Product Requirements, for additional provisions.

B. Provide 100 sq ft of flooring, 100 lineal feet of base, of each type and color specified.

## PART 2 PRODUCTS

### 2.01 MATERIALS - SHEET FLOORING

### 2.02 MATERIALS - TILE FLOORING

A. A. Luxury Vinyl Tile ( LVT ):

1. Style:Regency Tile
2. Color: from standard colors with Honed Stone Finish
3. Size: 18” x 18”
4. Thickness: 20 mil
5. Pattern: stack
6. Manufacturers: Artistek Floors

### 2.03 MATERIALS - BASE

A. Resilient Base: ASTM F 1861, Type TS rubber, vulcanized thermoset; **Roppe,Contours**
   1. Height: 4 inch.
   2. Thickness: 0.125 inch thick.
   3. Finish: Satin.
   4. Color: Color as selected from manufacturer's standards.

5. Accessories: Premolded external corners and end stops.

## 2.04 ACCESSORIES

A. Subfloor Filler: White premix latex; type recommended by adhesive material manufacturer.

B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.

C. Moldings and Edge Strips: Same material as flooring.

D. Sealer and Wax: Types recommended by flooring manufacturer.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive resilient flooring.

B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive resilient base.

C. Verify that sub-floor surfaces are dust-free and free of substances which would impair bonding of adhesive materials to sub-floor surfaces.

D. Verify that concrete sub-floor surfaces are ready for resilient flooring installation by testing for moisture emission rate and alkalinity in accordance with ASTM F 710; obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

E. Verify that required floor-mounted utilities are in correct location.

## 3.02 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with sub-floor filler to achieve smooth, flat, hard surface.

B. Prohibit traffic until filler is cured.

C. Clean substrate.

D. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

## 3.03 INSTALLATION - SHEET FLOORING

A. Install in accordance with manufacturer's instructions.

B. Spread only enough adhesive to permit installation of materials before initial set.

C. Set flooring in place, press with heavy roller to attain full adhesion.

D. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns carefully at seams.

E. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

F. Install flooring in recessed floor access covers. Maintain floor pattern.

### 3.04 INSTALLATION - TILE FLOORING

A. Install in accordance with manufacturer's instructions.

B. Mix tile from container to ensure shade variations are consistent when tile is placed.

C. Spread only enough adhesive to permit installation of materials before initial set.

D. Set flooring in place, press with heavy roller to attain full adhesion.

E. Where floor finishes are different on opposite sides of door, terminate flooring under centerline of door.

F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

G. Install flooring in recessed floor access covers. Maintain floor pattern.

### 3.05 INSTALLATION - BASE

A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.

B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.

C. Install base on solid backing. Bond tightly to wall and floor surfaces.

D. Scribe and fit to door frames and other interruptions.

### 3.06 CLEANING

A. Remove excess adhesive from floor, base, and wall surfaces without damage.

B. Clean, seal, and wax resilient flooring products in accordance with manufacturer's instructions.

### 3.07 PROTECTION OF FINISHED WORK

A. Prohibit traffic on resilient flooring for 48 hours after installation.

**END OF SECTION**

# SECTION 09680

# CARPET

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Carpet, direct-glued.

B. Accessories.

### 1.02 REFERENCES

A. CRI 104 - Standard for Installation of Commercial Textile Floorcovering Materials; Carpet and Rug Institute; 2002.

### 1.03 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate seaming plan, method of joining seams, direction of carpet pile and pattern, location of edge moldings and edge bindings.

C. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.

D. Manufacturer's Installation Instructions: Indicate special procedures.

E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.

### 1.04 QUALITY ASSURANCE

A. Installer Qualifications: Company specializing in installing carpet with minimum five years experience.

### 1.05 ENVIRONMENTAL REQUIREMENTS

A. Store materials in area of installation for minimum period of 24 hours prior to installation.

B. Maintain minimum 70 degrees F ambient temperature 24 hours prior to, during and 24 hours after installation.

C. Ventilate installation area during installation and for 72 hours after installation.

### 1.06 EXTRA MATERIALS

A. See Section 01600 - Product Requirements, for additional requirements.

B. Provide 100 sq ft of carpeting of each type, color, and pattern specified.

## PART 2 PRODUCTS

### 2.01 CARPET

A. Acceptable Products:

**A. CPT-1 - 2’x 2’carpet tile, Mannington Commercial, Canopy II ,** Color to be selected by Architect.

### 2.03 ACCESSORIES

A. Sub-Floor Filler: Type recommended by carpet manufacturer.

B. Tackless Strip: Carpet gripper, of type recommended by carpet manufacturer to suit application, with attachment devices.

C. Moldings and Edge Strips: Rubber, color as selected.

D. Adhesives: Type recommended by carpet manufacturer.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that sub-floor surfaces are smooth and flat within tolerances specified in Section 03300 and are ready to receive carpet.

B. Verify that concrete sub-floor surfaces are ready for carpet installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by carpet manufacturer and adhesive materials manufacturer.

C. Verify that required floor-mounted utilities are in correct location.

### 3.02 PREPARATION

A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.

B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.

C. Clean substrate.

### 3.03 INSTALLATION - GENERAL

A. Install carpet in accordance with manufacturer's instructions and CRI 104.

B. Verify carpet match before cutting to ensure minimal variation between dye lots.

C. Lay out carpet and locate seams in accordance with shop drawings:
   1. Locate seams in area of least traffic, out of areas of pivoting traffic, and parallel to main traffic.
   2. Do not locate seams perpendicular through door openings.
   3. Align run of pile in same direction as anticipated traffic and in same direction on adjacent pieces.
   4. Locate change of color or pattern between rooms under door centerline.
   5. Provide monolithic color, pattern, and texture match within any one area.

D. Install carpet tight and flat on subfloor, well fastened at edges, with a uniform appearance.

### 3.04 DIRECT-GLUED CARPET

A. Double cut carpet seams, with accurate pattern match. Make cuts straight, true, and unfrayed. Apply seam adhesive to cut edges of woven carpet immediately.

B. Apply contact adhesive to floor uniformly at rate recommended by manufacturer. After sufficient open time, press carpet into adhesive.

C. Apply seam adhesive to the base of the edge glued down. Lay adjoining piece with seam straight, not overlapped or peaked, and free of gaps.

D. Roll with appropriate roller for complete contact of adhesive to carpet backing.

E. Trim carpet neatly at walls and around interruptions.

**3.05 CLEANING**

A. Remove excess adhesive from floor and wall surfaces without damage.

B. Clean and vacuum carpet surfaces.

**END OF SECTION**

# SECTION 09900

# PAINTS AND COATINGS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Surface preparation.

B. Field application of paints, stains, varnishes, and other coatings.

### 1.02 RELATED SECTIONS

A. Section 05500 - Metal Fabrications: Shop-primed items.

B. Division 15 - Mechanical Identification: Painted identification.

C. Division 16 - Electrical Identification: Painted identification.

### 1.03 REFERENCES

A. ASTM D 16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2000.

B. ASTM D 4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 1992 (Reapproved 1997).

### 1.04 DEFINITIONS

A. Conform to ASTM D 16 for interpretation of terms used in this section.

### 1.05 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on all finishing products.

C. Manufacturer's Instructions: Indicate special surface preparation procedures and substrate conditions requiring special attention.

D. Samples: Provide approval samples 24 inch x 24 inch of required specialty or “faux” finishes for Architect approval.

### 1.06 MOCK-UPS

A. Provide mockups of all painted or stained surfaces. Mock-up may remain in place following approval of the Architect.

### 1.07 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum five years documented experience.

B. Applicator Qualifications: Company specializing in performing the work of this section with minimum five years experience.

### 1.08 REGULATORY REQUIREMENTS

A. Conform to applicable code for flame and smoke rating requirements for products and finishes.

### 1.09 DELIVERY, STORAGE, AND PROTECTION

A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.

B. Container Label: Include manufacturer's name, type of paint, brand name, lot number,

brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.

C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

### 1.10 ENVIRONMENTAL REQUIREMENTS

A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.

B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.

C. Minimum Application Temperatures for Latex Paints: 45 degrees F for interiors; 50 degrees F for exterior; unless required otherwise by manufacturer's instructions.

D. Minimum Application Temperature for Varnish Finishes: 65 degrees F for interior or exterior, unless required otherwise by manufacturer's instructions.

E. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

### 1.11 EXTRA MATERIALS

A. See Section 01600 - Product Requirements, for additional provisions.

B. Supply one gallons of each color; store where directed.

C. Label each container with color in addition to the manufacturer's label.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Paints:
   1. Base Manufacturer: Sherwin Williams: www.sherwin-williams.com.
   2. Other Acceptable Manufacturers:
      a. Duron, Inc: www.duron.com.
      b. ICI Paints North America: www.icidecorativepaints.com.
      c. Benjamin Moore & Co: www.benjaminmoore.com.
      d. PPG Architectural Finishes, Inc: www.ppgaf.com.

B. Substitutions: See Section 01600 - Product Requirements.

### 2.02 PAINTS AND COATINGS - GENERAL

A. Paints and Coatings: Ready mixed, except field-catalyzed coatings. Prepare pigments:
   1. To a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating.
   2. For good flow and brushing properties.
   3. Capable of drying or curing free of streaks or sags.

B. Specialty Finish Techniques: Coatings indicated on the drawings are to receive specialty or “faux” finishes matching approved submittals.

### 2.03 PAINT SYSTEMS - EXTERIOR

A. Wood, Transparent, Varnish, Stain:
   1. One coat of stain.
   2. One coat of sealer.
   3. One coat of varnish; satin.

B. Concrete/Masonry, Opaque, Alkyd, 3 Coat:
   1. One coat of block filler.

2. Eggshell: Two coats of alkyd enamel.

C. Gypsum Board and Plaster, Opaque, Latex, 3 Coat:
1. One coat of latex primer sealer.
2. Eggshell: Two coats of latex.

D. Ferrous Metals, Unprimed, Alkyd, 3 Coat:
1. One coat of alkyd primer.
2. Eggshell: Two coats of alkyd enamel.

E. Galvanized Metals, Alkyd, 3 Coat:
1. One coat galvanize primer.
2. Eggshell: Two coats of alkyd enamel.

F. Aluminum, Unprimed, Alkyd, 3 Coat:
1. One coat etching primer.
2. Eggshell: Two coats of alkyd enamel.

G. Pavement Marking Paint:
1. Specified in Section 02765 – Pavement Markings.

**2.04 PAINT SYSTEMS - INTERIOR**

A. Wood, Opaque, Latex, 3 Coat:
1. One coat of latex primer sealer.
2. Eggshell: Two coats of latex enamel.

B. Wood, Transparent, Varnish, Stain:
1. Filler coat (for open grained wood only).
2. One coat of stain.
3. One coat sealer.
4. Satin: One coat of varnish.

C. Concrete/Masonry, Opaque, Alkyd, 3 Coat:
1. One coat of block filler.
2. Eggshell: Two coats of alkyd enamel.

D. Ferrous Metals, Unprimed, Alkyd, 3 Coat:
1. One coat of alkyd primer.
2. Eggshell: Two coats of alkyd enamel.

E. Ferrous Metals, Primed, Alkyd, 2 Coat:
1. Touch-up with alkyd primer.
2. Eggshell: Two coats of alkyd enamel.

F. Galvanized Metals, Alkyd, 3 Coat:
1. One coat galvanize primer.
2. Eggshell: Two coats of alkyd enamel.

G. Aluminum, Unprimed, Alkyd, 3 Coat:
1. One coat etching primer.
2. Eggshell: Two coats of alkyd enamel.

H. Gypsum Board/Plaster, Latex-Acrylic, 3 Coat:
1. One coat of alkyd primer sealer.
2. Eggshell: Two coats of latex-acrylic enamel.

I. Fabrics/Insulation Jackets, Alkyd, 3 Coat:
1. One coat of alkyd primer sealer.
2. Eggshell: Two coats of alkyd enamel.

J. Specialty or “Faux” Finishes: Provide specialty finishes using application techniques required to match approved samples.

## 2.05 ACCESSORY MATERIALS

A. Accessory Materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; commercial quality.

B. Patching Material: Latex filler.

C. Fastener Head Cover Material: Latex filler.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Verify that surfaces are ready to receive Work as instructed by the product manufacturer.

B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.

C. Test shop-applied primer for compatibility with subsequent cover materials.

D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
   1. Plaster and Gypsum Wallboard: 12 percent.
   2. Masonry, Concrete, and Concrete Unit Masonry: 12 percent.
   3. Interior Wood: 15 percent, measured in accordance with ASTM D 4442.
   4. Exterior Wood: 15 percent, measured in accordance with ASTM D 4442.

## 3.02 PREPARATION

A. Surface Appurtenances: Remove electrical plates, hardware, light fixture trim, escutcheons, and fittings prior to preparing surfaces or finishing.

B. Surfaces: Correct defects and clean surfaces which affect work of this section.

C. Marks: Seal with shellac those which may bleed through surface finishes.

D. Impervious Surfaces: Remove mildew by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.

E. Concrete and Unit Masonry Surfaces to be Painted: Remove dirt, loose mortar, scale, salt or alkali powder, and other foreign matter. Remove oil and grease with a solution of tri-sodium phosphate; rinse well and allow to dry. Remove stains caused by weathering of corroding metals with a solution of sodium metasilicate after thoroughly wetting with water. Allow to dry.

F. Gypsum Board Surfaces to be Painted: Fill minor defects with filler compound. Spot prime defects after repair.

G. Insulated Coverings to be Painted: Remove dirt, grease, and oil from canvas and cotton.

H. Aluminum Surfaces to be Painted: Remove surface contamination by steam or high pressure water. Remove oxidation with acid etch and solvent washing. Apply etching primer immediately following cleaning.

I. Galvanized Surfaces to be Painted: Remove surface contamination and oils and wash with solvent. Apply coat of etching primer.

J. Uncoated Steel and Iron Surfaces to be Painted: Remove grease, mill scale, weld splatter, dirt, and rust. Where heavy coatings of scale are evident, remove by power tool wire brushing or sandblasting; clean by washing with solvent. Apply a treatment of

phosphoric acid solution, ensuring weld joints, bolts, and nuts are similarly cleaned. Prime paint entire surface; spot prime after repairs.

K. Shop-Primed Steel Surfaces to be Finish Painted: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces.

L. Interior Wood Items to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.

M. Interior Wood Items to Receive Transparent Finish: Wipe off dust and grit prior to sealing, seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after sealer has dried; sand lightly between coats. Prime concealed surfaces with gloss varnish reduced 25 percent with thinner.

N. Exterior Wood to Receive Opaque Finish: Remove dust, grit, and foreign matter. Seal knots, pitch streaks, and sappy sections. Fill nail holes with tinted exterior calking compound after prime coat has been applied. Back prime concealed surfaces before installation.

O. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

**3.03 APPLICATION**

A. Apply products in accordance with manufacturer's instructions.

B. Where adjacent sealant is to be painted, do not apply finish coats until sealant is applied.

C. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.

D. Apply each coat to uniform appearance. Apply each coat of paint slightly darker than preceding coat unless otherwise approved.

E. Sand wood surfaces lightly between coats to achieve required finish.

F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.

G. Where clear finishes are required, tint fillers to match wood. Work fillers into the grain before set. Wipe excess from surface.

**3.04 FINISHING MECHANICAL AND ELECTRICAL EQUIPMENT**

A. Refer to Division 15 and Division 16 for schedule of color coding of equipment, duct work, piping, and conduit.

B. Paint shop-primed equipment, where indicated.

C. Remove unfinished louvers, grilles, covers, and access panels on mechanical and electrical components and paint separately.

D. Finish equipment, piping, conduit, and exposed duct work in utility areas in colors according to the color coding scheme indicated.

E. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

**3.05 FIELD QUALITY CONTROL**

A. See Section 01400 - Quality Requirements, for general requirements for field inspection.

**3.06 CLEANING**

A. Collect waste material which may constitute a fire hazard, place in closed metal containers, and remove daily from site.

**3.07 SCHEDULE - SURFACES TO BE FINISHED**

A. Do Not Paint or Finish the Following Items:
   1. Items fully factory-finished unless specifically noted.
   2. Fire rating labels, equipment serial number and capacity labels.
   3. Stainless steel items.

B. Mechanical and Electrical: Use paint systems defined for the substrates to be finished.
   1. Paint all insulated and exposed pipes occurring in finished areas to match background surfaces, unless otherwise indicated.
   2. Paint shop-primed items occurring in finished areas.
   3. Paint interior surfaces of air ducts and convector and baseboard heating cabinets that are visible through grilles and louvers with one coat of Eggshell black paint to visible surfaces.
   4. Paint dampers exposed behind louvers, grilles, and convector and baseboard cabinets to match face panels.

C. Paint both sides and edges of plywood backboards for electrical and telephone equipment before installing equipment.

D. Paint all interior walls and ceilings per the Finish Schedule in the Construction Drawings. For additional clarity, exposed ceiling in the following rooms shall be painted as noted:

   1. Black/blackout: Rooms 102, 103, 104, 105, 122, 128, 129, 134, 135, 136, 137, 147 (a blackout line on the walls will be established in the field following installation of mechanical ductwork)

   2. White/whiteout: Rooms 118 and a portion of Room 117 (as indicated on the First Floor Reflected Ceiling Plan in the Construction Drawings)

**END OF SECTION**

**SECTION 10165**

**TOILET COMPARTMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

A. Plastic laminate toilet compartments.

B. Urinal screens.

**1.02 RELATED SECTIONS**

A. Section 05500 - Metal Fabrications: Concealed steel support members.

B. Section 06100 - Rough Carpentry: Concealed wood framing and blocking for compartment support.

C. Section 10800 - Toilet, Bath, and Laundry Accessories.

# POWDER SHIELD TOILET ENCLOSURES

## *THE CORINTHIAN* TYPE: FP-500 Overhead Braced

**MATERIALS:** Bonderized, Galvanized Steel

**THICKNESS:** Doors .....22 Gauge, Finished to 1" (25.4mm)
Panels .....20 Gauge, Finished to 1" (25.4mm)
Pilasters.....20 Gauge, Finished to 1 1/4" (31.75mm)

Doors:
Finished to 1"(25.4) thick, constructed of two sheets of 22-gauge, bonderized, galvanized steel formed and cemented under pressure to a honeycomb core. Door face sheets are welded at intervals around the entire perimeter. All edges to be finished with a 20-gauge interlocking molding. Corners are finished with pre-formed painted stainless steel (type 304) reinforcements. Corners are to be welded internally to ensure that the galvanized rust resistant coating is not removed. Doors shall have internal steel reinforcements to secure hardware items.

Panels:
Finished to 1" (25.4) thick, constructed of 2 sheets of 20-gauge bonderized, galvanized steel, formed and cemented under pressure to a honeycomb core. All partition edges are finished with a 20-gauge interlocking molding. Corners are finished with pre-formed painted stainless steel (type 304) reinforcements.

Pilasters:
Finished to 1 1/4" (31.75) thick, constructed of two sheets of 20-gauge, bonderized, galvanized steel, formed and assembled with a honeycomb core. Face sheets are electrically welded at intervals around the entire perimeter. All pilasters will have a 4" (102) high #4 finish stainless steel plinth (type 304) and have straight, flat sides with rounded edges to match the pilaster profile. Pilasters will have leveling bolts threaded to the pilaster support bracket. Floor mounting will be with #12 x 21/2" (63.5) screws and shields. Headrail is

anodized aluminum .050 (1.27) wall thickness with anti-grip profile. The headrail is set into a 16ga. channel reinforcement which occupies the full width of the pilaster and is electrically welded in place for maximum strength.

**FITTINGS:**
Wall fittings are die cast chrome plated. Minimum of two fittings at each connection.

**HARDWARE:**
Each compartment will be complete with all hardware, door hinges, latch, stop and keeper, coat hook, as well as all necessary fittings and fastenings for a complete installation. Hinges and door strikes are fastened by means of tamper- proof Torx-Pin Head through bolts, which are polished chrome plated. All other screws to be tamper-proof Torx-Pin Head chrome plated. Doors are to be hung on a concealed, *"stay-set"*, fully adjustable, non-rising door mechanism. Upper hinge pin shall be 3/8" (9.525) diameter steel. All hinges will have wrap-around flanges with a minimum of 5/8" (15.875) wrap onto pilaster. All doors will have a concealed ADA approved slide latch with external *"in-use"* indicator.

**FINISH:**
All rust inhibitive coated material shall be chemically cleaned and painted with multiple coats of Epoxy Hybrid Powder applied electrostatically. Color: Nickel Silver 304

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify that field measurements are as indicated.

B. Verify correct spacing of and between plumbing fixtures.

C. Verify correct location of built-in framing, anchorage, and bracing.

### 3.02 INSTALLATION

A. Install partitions secure, rigid, plumb, and level in accordance with manufacturer's instructions.

B. Maintain 3/8 to 1/2 inch space between wall and panels and between wall and end pilasters.

C. Attached panel brackets securely to walls using anchor devices.

D. Attach panels and pilasters to brackets. Locate head rail joints at pilaster center lines.

E. Field touch-up of scratches or damaged finish will not be permitted. Replace damaged or scratched materials with new materials.

### 3.03 ERECTION TOLERANCES

A. Maximum Variation From True Position: 1/4 inch.

B. Maximum Variation From Plumb: 1/8 inch.

### 3.04 ADJUSTING

A. Adjust and align hardware to uniform clearance at vertical edge of doors, not exceeding 3/16 inch.

B. Adjust hinges to position doors in partial opening position when unlatched. Return out-swinging doors to closed position.

C. Adjust adjacent components for consistency of line or plane.

**END OF SECTION**

# SECTION 10441

# INTERIOR SIGNS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Unframed signs, with embossed face, for interior applications.

### 1.02 QUALITY ASSURANCE

A. Supplier: Obtain all products in this section from a single supplier.

B. Regulatory Requirements: Products shall meet requirements of the Americans With Disabilities Act Accessibility Guidelines (ADAAG) and local amendments and modifications.

C. Installer: Installation shall be performed by installer specialized and experienced in work similar to that required for this project.

### 1.03 SUBMITTALS

A. Submit in accordance with requirements of section 01300.

B. Product Data: Submit product data for specified products. Include material details for each sign specified.

C. Shop Drawings: Submit shop drawings showing layout, profiles, and product components, including dimensions, anchorage, and accessories.

D. Samples: Submit supplier’s standard color chart for selection purposes and selected colors for verification purposes.

E. Installation: Submit supplier’s installation instructions.

F. Closeout Submittals:
   1. Submit operation and maintenance data for installed products, including precautions against harmful cleaning materials and methods.
   2. Submit warranty documents specified herein.

### 1.04 DELIVERY, STORAGE, AND HANDLING

A. Comply with manufacturer's ordering instructions and lead time requirements to avoid construction delays.

B. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.

C. Store products protected from weather, temperature, and other harmful conditions as recommended by supplier.

D. Handle products in accordance with manufacturer's instructions.

### 1.05 WARRANTY

A. Project Warranty: Comply with requirements of Division 1.

B. Manufacturer's Warranty: Submit manufacturer's standard warranty document executed by authorized company official.

C. Warranty Period: One year from product ship date.

## PART 2 PRODUCTS

### 2.01 SIGNAGE SYSTEMS

A. Acceptable Manufacturers:
   1. Interior sign products indicated in this section are manufactured by ASI-Modulex and establish a standard of quality for products of this section. Substitutions permitted under provisions of Section 01600.

B. Acceptable Product: EmBoss ADA-Ready Sign System, manufactured by ASI-Modulex with requirements indicated for materials, thickness, finish colors, designs, shapes, sizes and details.

### 2.02 SIGN MATERIALS

A. Mounting Panel: Acrylic.

B. Face: Vacuum formed 1.5 mil, clear, scratch resistant PVC/vinyl acetate bonded to acrylic mounting panel.

### 2.03 FABRICATION OPTIONS

A. Tactile Graphics and Text:
   1. Fabrication process: Provide tactile copy and grade 2 Braille raised 1/32 inch minimum from plaque first surface by manufacturer’s vacuum formed embossing process.
   2. Provide lettering and graphics precisely formed, uniformly opaque to comply with relevant ADA regulations and requirements indicated for size, style, spacing, content, position, and colors.

B. Mounting Panel Options:
   1. .080 inch thick matte finished acrylic.

C. Background Appearance Options:
   1. Solid color: Select from manufacturer’s standard range.
   2. Subsurface custom graphics.

D. Tactile Lettering and Graphics Color Options: Select from 3M standard vinyl colors.

E. Overall panel size: 6 x 8 inches.

F. Shape: Standard.

G. Selected from manufacturer's standard letter styles and color charts.

### 2.04 INSTALLATION METHODS

A. System VT, vinyl tape.

### 2.05 FABRICATION - GENERAL

A. General: Comply with requirements indicated for materials, thicknesses, finishes, colors, designs, shapes, sizes, and details of construction.

B. Preassemble signs in the shop to the greatest extent possible to minimize field assembly. Disassemble signs only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation, in a location not exposed to view after final assembly.

C. Conceal fasteners if possible; otherwise, locate fasteners to appear inconspicuous.

D. Form panels to required size and shape. Comply with requirements indicated for design, dimensions, finish, color, and details of construction.

E. Coordinate dimensions and attachment methods to produce message panels with closely fitting joints. Align edges and surfaces with one another in the relationship indicated.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Site Verification of Conditions: Verify installation conditions previously established under other sections are acceptable for product installation in accordance with manufacturer's instructions.

B. Scheduling of installation by Owner or it's representative implies that substrate and conditions are prepared and ready for product installation. Proceeding with installation implies installer's acceptance of substrate and conditions.

### 3.02 INSTALLATION

A. Install product in accordance with supplier's instructions.

B. Install product in locations indicated using mounting methods recommended by sign manufacturer and free from distortion, warp, or defect adversely affecting appearance.

C. Install product level, plumb, and at heights indicated.

D. Install product at heights to conform to Americans with Disabilities Act Accessibility Guidelines (ADAAG) and applicable local amendments and regulations.

E. Install signs within the following tolerances and in accordance with manufacturer's recommendations:
   1. Interior Signs: Within 1/4 inch vertically and horizontally of intended location

### 3.03 CLEANING, PROTECTION AND REPAIR

A. Repair scratches and other damage which might have occurred during installation. Replace components where repairs were made but are still visible to the unaided eye from a distance of 5 feet.

B. Remove temporary coverings and protection to adjacent work areas. Clean installed products in accordance with manufacturer's instructions prior to Owner's acceptance. Remove construction debris from project in accordance with provisions in Division 1

### 3.04 SIGN SCHEDULE

A. Schedule: Provide signs at the elevator and all restrooms.

**END OF SECTION**

# SECTION 10523

# FIRE EXTINGUISHERS AND CABINETS

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Fire extinguishers.

B. Fire extinguisher cabinets.

### 1.02 RELATED SECTIONS

A. Section 09260 – Gypsum Board Assemblies: Metal blocking and shims.

### 1.03 REFERENCES

A. NFPA 10 - Standard for Portable Fire Extinguishers; National Fire Protection Association; 1998.

B. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc.; current edition.

C. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 1998.

D. TEXAS ACCESSIBILITY STANDARDS (TAS) of the Architectural Barriers Act Article 9102, Texas Civil Statutes.

### 1.04 PERFORMANCE REQUIREMENTS

A. Conform to NFPA 10.

B. Provide extinguishers classified and labeled by Underwriters Laboratories Inc. for the purpose specified and indicated.

### 1.05 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Shop Drawings: Indicate rough-in measurements for recessed cabinets.

C. Product Data: Provide extinguisher operational features and color and finish.

D. Manufacturer's Installation Instructions: Indicate special criteria and wall opening coordination requirements.

E. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

F. Maintenance Data: Include test, refill or recharge schedules and re-certification requirements.

### 1.06 ENVIRONMENTAL REQUIREMENTS

A. Do not install extinguishers when ambient temperature may cause freezing of extinguisher ingredients.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Fire Extinguishers, Cabinets and Accessories:
   1. Larsen's Manufacturing Co.
   2. J.L. Industries Inc.

2. Substitutions: Under provisions of Section 01600.

## 2.02 FIRE EXTINGUISHERS

A. Multi-Purpose Dry Chemical Type: Cast steel tank, with pressure gage.
   1. Size 10.
   2. Finish: Baked enamel, red color.

## 2.03 FIRE EXTINGUISHER CABINETS

A. Fire extinguisher cabinets indicated in this section are manufactured by Larsen's Manufacturing Company and establish a standard of quality for products of this section. Substitutions permitted under provisions of Section 01600
   1. Acceptable Product: Model No. 2409-6R, Vertical Duo, clear aluminum finish, vertical lettering, manufactured by Larsen's Manufacturing Company.

B. Cabinet Mounting Hardware: Appropriate to cabinet. Pre-drill for anchors.

# PART 3 EXECUTION

## 3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify rough openings for cabinet are correctly sized and located.

## 3.02 INSTALLATION

A. Install in accordance with Texas Accessibility Standards.

B. Install in accordance with manufacturer's instructions.

C. Install cabinets plumb and level in wall openings.

D. Secure rigidly in place.

**END OF SECTION**

# SECTION 10651

# OPERABLE PANEL PARTITIONS

## PART 1 - GENERAL

### 1.01 DESCRIPTION

A. General
   1. Furnish and install operable partitions and suspension system. Provide all labor, materials, tools, equipment, and services for operable walls in accordance with provisions of contract documents.

### 1.02 RELATED WORK BY OTHERS

A. Preparation of opening will be by General Contractor. Any deviation of site conditions contrary to approved shop drawings must be called to the attention of the architect.
B. All header, blocking, support structures, jambs, track enclosures, surrounding insulation, and sound baffles as required in 1.04 Quality Assurance.
C. Prepunching of support structure in accordance with approved shop drawings.
D. Paint or otherwise finishing all trim and other materials adjoining head and jamb of operable partitions.

### 1.03 SUBMITTALS

A. Complete shop drawings are to be provided prior to fabrication indicating construction and installation details. Shop drawings must be submitted within 60 days after receipt of signed contract.

### 1.04 QUALITY ASSURANCE

A. Preparation of the opening shall conform to the criteria set forth per ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions.
B. The partition STC (Sound Transmission Classification) shall be achieved per the standard test methods ASTM E90.
C. Noise isolation classifications shall be achieved per the standard test methods ASTM E336 and ASTM E413.
D. Noise Reduction Coefficient (NRC) ratings shall be per ASTM C423.
E. The manufacturer shall have a quality system that is registered to the ISO 9001 standards.

### 1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Proper storage of partitions before installation and continued protection during and after installation will be the responsibility of the General Contractor.

### 1.06 WARRANTY

A. Partition shall be guaranteed for a period of one year.

B. The Warranties submitted under this Section shall not deprive the Owner of other rights or remedies that the Owner may have under other provisions of the Contract Documents and the laws of governing jurisdictions and is in addition to and runs concurrently with other warranties made by the Contractor under requirements of the Contract

## PART 2 - PRODUCTS

### 2.01 ACCEPTABLE MANUFACTURERS

A. Drawings and specifications are based on manufacturer's literature from Modernfold, Inc unless otherwise indicated. Other manufacturers to comply with the minimum levels of material and detailing indicated on the drawings and in conformance with provisions of Section 01600 – Product Requirements.

**Contact Modernfold rep:**
**Craig Cowsert, TRW Dallas, 214-542-5284 ( office )**
**480-220-8723 ( cell )**

**2.02 MATERIALS**

A. Weight of the panels shall be 7.8-10.9 lbs./sq. ft. based on options selected.

B. Suspension system:
   1. For panels to 1000 lbs: Track shall be of dark bronze anodized architectural grade extruded aluminum alloy. Track design shall provide precise alignment at the trolley running surfaces and provide integral support for adjoining, clad beam/ soffit. Track shall be connected to the structural support by pairs of min. 3/8" [10] dia. threaded steel hanger rods. Pairs of rods are directly attached to the track, no single point attachment allowed. L, T, or X intersections shall be factory assembled and welded.

C. Finishes
   1. Face finish shall be: stained grade red oak veneer with stained to match 1 x red oak wood trim panels on both faces as indicated on door schedule. ( See Sheet A4.1 ).
   2. Aluminum track & trim shall be dark bronze
   3. End cap/ side jamb covering to be vinyl : suede fudge 222
   4. Provide hand pulls on both side ( 4 total )

**2.03 OPERATION**

A. Panels shall be manually moved from the storage area ( three 4' panels to form one on each side/ opposite direction ),center positioned in the opening.

**PART 3 - EXECUTION**

**3.01 INSTALLATION**

A. The complete installation of the operable wall system shall be by an authorized factory-trained installer and be in strict accordance with the approved shop drawings and manufacturer's standard printed specifications, instructions, and recommendations.

**3.02 CLEANING**

A. Cleaning
   1. All track and panel surfaces shall be wiped clean and free of handprints, grease, and soil.
   2. Cartons and other installation debris shall be removed from the job site.

**3.03 TRAINING**

A. Installer shall demonstrate proper operation and maintenance procedures to owner's representative.

**END OF SECTION**

**SECTION 10800**

**TOILET ACCESSORIES**

## PART 1 GENERAL

### 1.01 SECTION INCLUDES

A. Accessories for toilet rooms.

B. Grab bars.

### 1.02 RELATED SECTIONS

A. Section 10165 – Plastic Laminate Toilet Compartments.

### 1.03 REFERENCES

A. ASTM A 123/A 123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 1997a.

B. ASTM A 269 - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service; 1998.

C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 1999a.

D. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 1999.

E. ASTM C 1036 - Standard Specification for Flat Glass; 1991 (Reapproved 1997).

F. GSA CID A-A-3002 - Mirrors, Glass; U.S. General Services Administration; 1996.

G. ANSI/ICC A117.1 - American National Standard for Accessible and Usable Buildings and Facilities; International Code Council; 1998.

H. TEXAS ACCESSIBILITY STANDARDS (TAS) of the Architectural Barriers Act Article 9102, Texas Civil Statutes.

### 1.04 SUBMITTALS

A. See Section 01300 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide data on accessories describing size, finish, details of function, attachment methods.

C. Samples: Submit two samples of each accessory, illustrating color and finish.

D. Manufacturer's Installation Instructions: Indicate special procedures, and conditions requiring special attention.

### 1.05 COORDINATION

A. Coordinate the work with the placement of internal wall reinforcement, and reinforcement of toilet partitions to receive anchor attachments.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

A. Products scheduled are those manufactured by American Specialties, Inc. The scheduled products establish an acceptable standard of quality.

B. Substitutions permitted under provisions of Section 01600.

### 2.02 MATERIALS

A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
   1. Grind welded joints smooth.
   2. Fabricate units made of metal sheet of seamless sheets, with flat surfaces.

B. Keys: Provide 3 keys for each accessory to Owner; master key all lockable accessories.

C. Stainless Steel Sheet: ASTM A 666, Type 304.

D. Stainless Steel Tubing: ASTM A 269, Type 304 or 316.

E. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A 653/A 653M, with G90/Z275 coating.

F. Mirror Glass: Float glass, Type I, Class 1, Quality q2 (ASTM C 1036), with silvering, copper coating, and suitable protective organic coating to copper backing in accordance with GSA CID A-A-3002.

G. Adhesive: Two component epoxy type, waterproof.

H. Fasteners, Screws, and Bolts: Hot dip galvanized, tamper-proof, security type.

I. Expansion Shields: Fiber, lead, or rubber as recommended by accessory manufacturer for component and substrate.

### 2.03 FINISHES

A. Stainless Steel: No. 4 satin brushed finish, unless otherwise noted.

B. Galvanizing for Items other than Sheet: ASTM A 123/A 123M to 1.3 oz/sq yd. Galvanize ferrous metal and fastening devices.

C. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.

D. Back paint components where contact is made with building finishes to prevent electrolysis.

### 2.04 TOILET ROOM ACCESSORIES

A. Products listed are those manufactured by American Specialties, Inc. The listed products establish an acceptable standard of quality.

B. Schedule: Refer to drawings for toilet accessory schedule.

## PART 3 EXECUTION

### 3.01 EXAMINATION

A. Verify existing conditions before starting work.

B. Verify exact location of accessories for installation.

C. Verify that field measurements are as indicated on drawings.

### 3.02 PREPARATION

A. Deliver inserts and rough-in frames to site for timely installation.

B. Provide templates and rough-in measurements as required.

### 3.03 INSTALLATION

A. Install accessories in accordance with manufacturers' instructions.

B. Install plumb and level, securely and rigidly anchored to substrate.

C. Mounting Heights and Locations: As required by accessibility regulations, and as indicated on drawings and as follows:

**END OF SECTION**

# SECTION 13121 - PRE-ENGINEERED BUILDINGS

## PART 1 - GENERAL

### 1.1 SECTION INCLUDES:

A. Pre-engineered metal building, complete with structural framing (columns, rafters, struts, purlins, girts, metal decking); prefinished roofing; roof insulation; building canopies; metal flashings; trim; gutters and downspouts; diagonal bracing; fasteners; roof accessories and other components and material required for a complete installation.

B. Complete roof covering system consisting of the exterior roof panels, panel attachments, sealants, mastics, trim and flashings as required.

C. Secondary structural wall/eave members as indicated for support of metal stud exterior walls.

### 1.2 RELATED SECTIONS:

A. Section 03300 - Cast-in-Place Concrete: Foundations and anchor bolts.

B. Section 05120 - Structural Steel.

C. Section 05210 - Steel Bar Joists.

D. Section 05311 - Steel Floor Deck

E. Section 09900 - Paints and Coatings: Finish painting of structural members.

### 1.3 REFERENCES:

A. ASTM A 36/ASTM A36M - Standard Specification for Carbon Structural Steel.

B. ASTM A 307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.

C. ASTM A 325 - Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.

D. ASTM A 529/A 529M - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.

E. ASTM A 570/A 570M - Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled, Structural Quality.

F. ASTM A 572/A 572M - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Steel.

G. ASTM A 653/A 653M - Standard Specification for Steel Sheets, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

H. ASTM A 792/A 792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.

I. ASTM D 635 - Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Self-Supporting Plastics in a Horizontal Position.

J. ASTM D 1929 - Standard Test Method for Ignition Properties of Plastics.

K. ASTM D 2843 - Standard Test Method for Smoke from the Burning or Decomposition of Plastics.

L. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

M. UL 580 - Tests For Wind Uplift Resistance of Roof Assemblies; Underwriters Laboratories Inc.

1.4 DEFINITIONS:

A. Building Width: Measured from outside to outside of sidewall girts.

B. Building Length: Measured from outside to outside of endwall girts.

C. Building Line: Outside face of horizontal steel girt.

D. Building Eave Height: Measured from the intersection of the top of the roof framing and the outside of the wall framing to the bottom of the sidewall column base plate.

E. Bay Spacing: Measured from centerline to centerline of primary frames for interior bays and from centerline of the first interior frame to outside of endwall girts for endbays.

F. Roof Pitch: The ratio of the vertical rise to the horizontal run.

1.5 DESIGN CRITERIA:

A. Design structural systems according to professionally recognized methods and standards and legally adopted building codes.

B. Design under supervision of professional engineer licensed in Texas.

C. Manufacturer must be certified by AISC in the Metal Building (MB) category.

D. Supplier must be a primary manufacturer of frames, secondary steel, roof and wall sheeting and trim.

E. Design Loads:

1. Applicable Building Code: 2009 International Building Code.

2. Live Loads:

a. Roof: 20 psf - reducible.

3. Collateral Load: 10 psf

This loading is in addition to Dead Loads from permanent building components such as structural steel beams, purlins, roof panels, and insulation.

4. Wind Load: 2009 International Building Code, using 90 mph Basic Wind Speed, Exposure Category C, and Importance Factor 1.0

5. Roof Wind Load: In addition to meeting the requirements of the 2000 International Building Code design for Factory Mutual 1-90 Wind Load.

6. Dead Loads, include the weight of all indicated permanent construction.

F. Building Drift: Calculated horizontal deflection (lateral drift) of the Building Frame at eave height shall be less than or equal to 1/250 of the eave height for Code specified wind loads.

G. Component Deflections:

1. Purlins, rafters, girts/eave members supporting metal stud EIFS exterior wall: L/240.

2. Girts/eave members supporting metal stud masonry wall: L/500.

H. Anchor Bolts: ASTM A307. Provide number, size, and layout required by building design. Provide anchor bolt details below the base plate.

I. Column Base Support Assumptions: Analysis of Building Frame shall assume all column base supports are pinned.

1.6 SUBMITTALS:

A. To comply with general conditions.

B. Shop Drawings and Calculations:

1. Design Calculations and Erection Drawings: Prepared by, or under direct supervision of, Registered Professional Engineer, licensed to practice in State of Texas with all drawings and calculations bearing engineer's seal.

2. Show each type structural building frame required and their locations within structure; details of anchor bolt settings; sidewall, endwall, and roof framing; diagonal bracing and location within structure; metal floor deck and joist types; wall and roof insulation and types; longitudinal and transverse cross sections; details of curbs, roof jacks, and items penetrating roof; canopy framing and details; trim, gutters, downspouts, liner panels, wall and roof coverings, and all accessory items; materials; finishes; construction and installation details; and other pertinent information required for proper and complete fabrication, assembly and erection of watertight metal building system.

C. Certification: Two (2) copies of written certification, prepared and signed by Registered Professional Engineer licensed to practice in State of Texas, attesting that building design meets specified loading requirements, requirements of codes and authorities having jurisdiction at project site, and other requirements specified.

D. Metal building manufacturer will furnish to the architect certification that he is a member of the Metal Building Manufacturers' Association and has been certified by the American Institute of Steel Construction Quality Certification Program for Category MB - Metal Building Systems.

E. Metal Building erector will furnish to the architect certification that he has at least five(5) years experience in the erection of metal buildings of the type and size of this project.

F. Product Data: Information on manufactured products to be incorporated into the project.

G. Material and Color Samples: Selected from Standard Pre-finishes colors

1. For each specific material sample requested by architect, submit in size, form, and number directed.

2. Submit duplicate color sample sets showing full color range available, for selection purposes.

1.7 WARRANTY:

A. Provide manufacturer's standard warranty for:

1. Materials and workmanship: 2 years.

2. Roof panel finish: 20 years.

3. Weathertightness: 20 years.

PART 2 - PRODUCTS

2.1 METAL MATERIALS:

A. Select materials and material yield strengths based on building design requirements; use the following unless required otherwise.

B. Structural Steel Plate, Bar, Sheet, and Strip for Use in Bolted and Welded Constructions: ASTM A 572/A 572M/A570, A 529/A 529M or A 36, with minimum yield strength of 50,000 psi (345 MPa).

C. Structural Steel Material for Use in Roll Formed or Press Broken Secondary Structural Members: ASTM A 570/A 570M,or A607 with minimum yield strength of 55,000 psi (380 MPa).

D. Galvanized Steel Sheet for Roll Formed or Press Broken Roof and Wall Coverings, Trim and Flashing: ASTM A 653/A 653M, with minimum yield strength of 50,000 psi (345 MPa).

E. Galvalume Steel Sheet Used in Roll Formed or Press Broken Roof Covering: Aluminum-zinc alloy-coated steel sheet, ASTM A 792/A 792M, with minimum yield strength of 50,000 psi (345 MPa); nominal coating weight of 0.5 oz per sq. ft (152 kg/sq m) both sides, equivalent to an approximate coating thickness of 0.0018 inch (0.05 mm) both sides.

F. Hot Rolled Steel Shapes: W, M and S shapes, angles, rods, channels and other shapes; ASTM A 572/A 572M or ASTM A 36/A 36M as applicable; with minimum yield strengths required for the design.

G. Steel Joist: Per specification section 05210.

H. Metal Form Deck: Per specification section 05311.

I. Structural Bolts and Nuts Used with Primary Framing: High strength, ASTM A 325.

J. Bolts and Nuts Used with Secondary Framing Members and Anchor Bolts: ASTM A 307.

2.2 FRAMING COMPONENTS:

A. Primary Framing: Rigid Frame (RF Series) solid web framing consisting of tapered rafters rigidly connected to tapered columns. Provide a clear span that supports the loads at bay spacings indicated.

B. Endwall Framing: Corner posts, endposts and rake beams.

C. Purlins: Zee-shaped; depth as required; with minimum yield strength of 55,000 psi (345 MPa); simple span or continuous span as required for design.

D. Girts / Eave members supporting exterior wall metal stud framing: Zee- or Cee-shaped gage metal or structural steel shapes; depth as required; simple span or continuous span as required for design.

E. Transbay Members: Open web, parallel chord, secondary joists; simple span, utilizing materials, sizes and yield strength as required.

F. Wind Bracing: Portal, torsional, diagonal bracing or diaphragm in accordance with manufacturer’s standard design practices; utilizing rods, angles, and other members, with minimum yield strengths as required for design.

G. Primary Frame Flange Bracing: Attached from purlins or girts to the primary framing, minimum yield strength as required for design.

H. Base Angles: 2 inch x 3 inch x 0.059 inch (50 mm x 75 mm x 1.5 mm) steel angles, with minimum yield strength of 55,000 psi (38 MPa), anchored to the floor slab or grade beam with power driven fasteners or equivalent at a maximum spacing of 2 feet (1220 mm) on center and not more than 6 inches (150 mm) from the end of any angle member.

I. Door Headers and Jambs: Zee- or Cee-shaped; depth as required; with minimum yield strength of 55,000 psi (380 MPa).

J. Sag Angles and Bridging: Steel angles, with minimum yield strength of 36,000 psi (250 MPa).

K. Fabrication: Fabricate according to manufacturer's standard practice.

1. Fabricate structural members made of welded plate sections by jointing the flanges and webs by continuous automatic submerged arc welding process.

2. All welding operators and processes shall be qualified in accordance with the American Welding Society "Structural Welding Code", AWS D1.1.

3. Field connections. Prepare members for bolted field connections by making punched, drilled, or reamed holes in the shop.

L. Component Identification: Mark all fabricated parts, either individually or by lot or group, using an identification marking corresponding to the marking shown on the shop drawings, using a method that remains visible after shop painting.

M. Shop Coating: Finish all structural steel members using one coat of manufacturer's standard shop coat, after cleaning of oil, dirt, loose scale and foreign matter.

N. Package building components for shipping by common carrier.

2.3 ROOF PANEL COMPONENTS:

A. Roof Panels: SSR Standing Seam Roof Panels; 24 inches (610 mm) wide net coverage, with 3 inches (75 mm) high major ribs formed at the panel side laps, formed for field seaming using electrically operated seaming machine.

1. Side Joints: Factory applied sealant for field seaming.

2. Material: Galvalume steel.

3. Thickness: 22 gage (0.76 mm).

4. Side laps: Two factory-formed interlocking ribs, with one weather sealed joint, mechanically field-seamed into place to form a double-fold 360 degree seam.

5. Length: Continuous from eave to ridge.

6. Endlaps, Where Required: 7 inches (178 mm) wide, located at a support member.

7. Finish: Kynar pre-painted finish, standard color.

8. Panel-to-roof purlin structural attachments: SSR clips with movable tabs which interlock with seamed SSR panel ribs and provide for 1-1/2 inch (37mm) of panel movement in either direction from center of clip to compensate for thermal effects.

9. The SSR Roof System shall be tested and certified by Factory Mutual to meet the following tests: FM 1-90.

10. The SSR Roof System shall be tested and certified to meet Underwriters Laboratory UL 90 wind uplift rating.

11. Panels shall have been tested in accordance to ASTME-1592.

12. Panel fastening to meet uplift requirements shall be based on tested fastener values with appropriate Safety Factors.

13. Purlin strength with the SSR roof panel shall be determined and tested in accordance with AISI procedures.

B. Ridge Assembly for High End of Slopes: SSR Ridge**;** draw-formed aluminum seam caps factory-attached to SSR ridge panels that are mechanically field-seamed together along the center of the ridge, utilizing only one weather sealed joint and providing a true expansion joint for panel movement.

C. Wall Panels: Deep Rib Liner Panels**;** 36 inch (915 mm) wide net coverage, with 1-3/16 inch (30 mm) high major ribs with minor ribs spaced between the major ribs.

1. Material: Galvanized steel, with G90/Z275 coating.

2. Thickness: 24 gage (0.61 mm).

3. Length: Continuous from sill to eave.

4. Finish: Galvalume

D. Soffit Panels: minimum depth rib panels.

E. Panel Fasteners:

1. Galvalume finished roof panels: Stainless steel-capped carbon steel fasteners with integral sealing washer.

2. Concealed Fasteners: Self-drilling type, of size as required.

3. Provide fasteners in quantities and location as required by the manufacturer.

F. Flashing and Trim: Match material and color of adjacent components. Provide trim at rakes, including peak and corner assemblies, high and low eaves, corners, bases, framed openings and as required or specified to provide weathertightness and a finished appearance.

G. Plastic Parts: Glass fiber reinforced resin or thermoformed ABS (Acrylonitrile-Butidene-Styrene).

1. ABS: Minimum 1/8 inch (3 mm) thick.

2. Color: Manufacturer's standard color.

H. Sealants, Mastics and Closures: Manufacturer's standard type.

1. Provide at roof panel endlaps, sidelaps, rake, eave, transitions and accessories as required to provide a weather resistant roof system; use tape mastic or gunnable sealant at sidelaps and endlaps.

2. Provide at wall panel rakes, eaves, transitions and accessories.

3. Closures: Formed to match panel profiles; closed cell elastic material, manufacturer's standard color.

4. Tape Mastic: Pre-formed butyl rubber-based, non-hardening, non-corrosive to metal; white or light gray.

5. Gunnable Sealant: Non-skinning synthetic elastomer based material; gray or bronze.

I. Blanket Insulation: Glass fiber, with factory laminated facing material.

1. Glass fiber: Odorless, neutral colored, long filament, flexible resilient, produced in compliance with the NAIMA 202 specifications.

2. Thermal Resistance: to meet R-10 plus R=13 at wall cavity, R=19 + R-11 at roof @ 75 degrees F mean temperature.

3. Flame spread Index: 25 or less, when tested in accordance with UL 723.

4. Smoke Developed Index: 50 or less, when tested in accordance with UL 723.

5. UL Classified.

6. Facing at exposed roof: Heavy duty white vinyl scrim foil; 0.002 inch (0.02 mm) thick vinyl film, glass fiber scrim reinforcing, 0.0005 inch (0.013 mm) aluminum foil; permeance 0.02 perms (1.1 ng/Pa s sq m). Composite fiberglass and facing to meet Flame Spread of 25 or less, Smoke Developed of 50 or less, when tested in accordance with UL 723.

7. Provide facing 3 inches (75 mm) wider on both edges than blanket.

8. Width: As required for installation.

9. Use blanket insulation at roof, and walls.

J. Thermal Blocks**:** High density, 3/4 inch (19 mm) thick extruded polystyrene, for installation over the purlin.

2.5 ROOF ACCESSORIES:

A. Eave Gutters: Roll-formed 26 gage (0.45 mm) steel sheet, with gutter straps, fasteners and joint sealant.

1. Downspouts: 4 x 5 inches ( 100 by 125 mm) in 10 foot (3050 mm) lengths, with downspout elbows and downspout straps; same color as wall panels.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Verify that foundations are installed correctly.

B. Verify that anchor bolts are installed as indicated on anchor bolt shop drawings.

3.2 ERECTION

A. Erect pre-engineered building in accordance manufacturer’s instructions, erection drawings, and other erection documents.

B. Provide temporary bracing, shoring, blocking, bridging and securing of components as required during the erection process.

**END OF SECTION**